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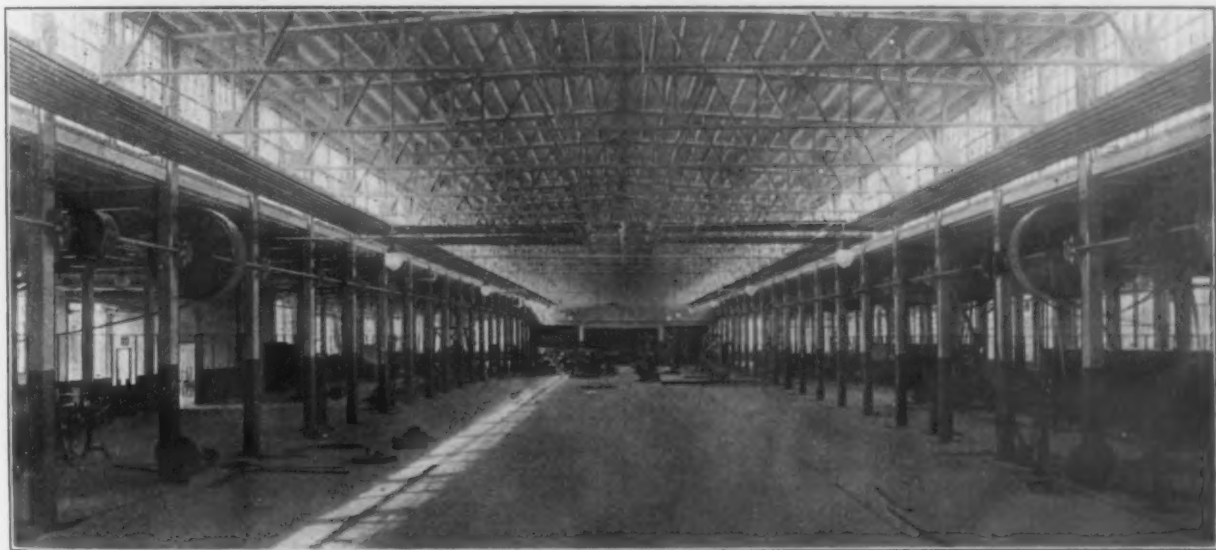
Plants of New Merger at Buchanan, Mich.

Clark Equipment Company, Making Drills, Axles
and Electric Furnace Castings—Machine Shop Details
and Participation of Employees Among Features

ON Jan. 1 a merger of the Buchanan Electric Steel Company and the Celfor Tool Company, Buchanan, Mich., became effective as the Clark Equipment Company, with E. B. Clark, president. The new company has a capital of \$5,000,000, of which \$2,000,000 is preferred and \$3,000,000 common stock.

The effecting of this reorganization calls attention to the development of two associated enterprises whose growth has been especially interesting. It is worth mentioning that the management

ganized in 1911 and for a time was engaged in general jobbing work, having installed two Stassano-type electric furnaces of small capacity. By 1913 the company had developed the design of the cast steel motor truck wheel now prominently featured in the equipment of several important makes of trucks. With the increase in the axle business of the Celfor Tool Company, which was dependent upon this steel foundry for castings, and with the beginning of manufacture of truck wheels weighing up to 600 lb., the need of larger furnaces became



The New Axle Shop Before Installing the Machinery

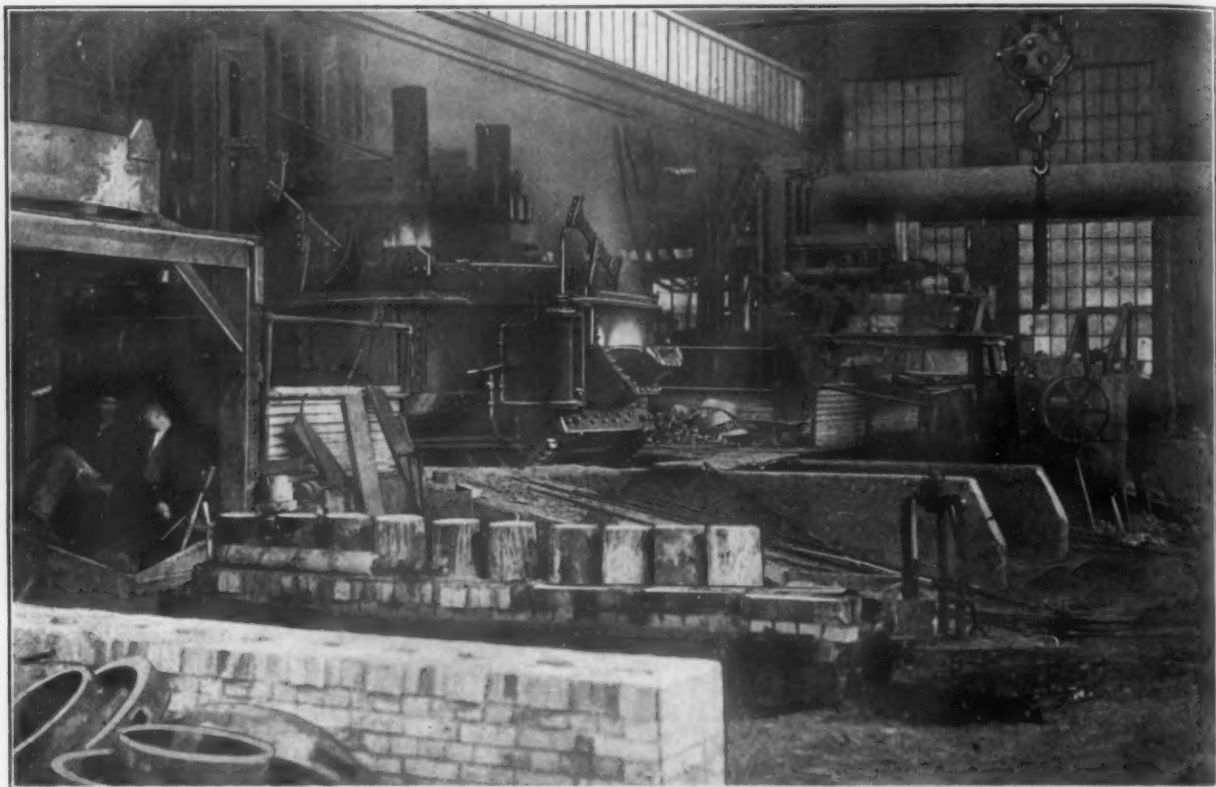
of these industries in respect to both mechanical and commercial problems has been almost entirely under the direction of a group of present and former blast-furnace and steel-mill operators, and also that the business, supplying equipment entering into motor vehicle manufacture, has been one of many examples of rapid growth to profit through the phenomenal expansion of the automobile industry.

The Celfor Tool Company, a pioneer in the manufacture of flat twisted and forged high-speed drills, began operations in 1904 with a force of three men. In addition to the rapid growth of its drill business, the company designed and in 1912 began to manufacture automobile and truck driving axles. By 1915 the production of axles had reached 300 per month and, in 1916, with the completion of its new axle shop, capacity had been increased to 2100 axles per month.

The Buchanan Electric Steel Company was or-

imperative and two Heroult units of 2 and 5 tons capacity, respectively, were installed in place of the Stassano furnaces. The foundry is now casting 75 to 100 wheels per day and has reduced its general contract work to a very small proportion of its daily output of about 45 to 50 tons.

The general arrangement of the Clark Equipment Company's plant is shown in the panorama view, extending from the steel foundry at the right to the new axle shop at the left. From this view the effort of the company to make the surroundings of its plant as attractive as possible are apparent. The axle shop, which was completed in the early summer of last year, incorporates a number of unusual details in its construction. It is 303 ft. long by 136 ft. wide, arranged with a central longitudinal bay 50 ft. wide, flanked by a 25-ft. bay on each side, these in turn being paralleled by 18-ft. wall bays. Above the center bay is the usual type of monitor roof, fitted with Payson continuous sash.



The Larger of the Electric Furnaces Was Recently Used for Making Alloy Steel Ingots

The side wall sash, which is pivoted, was supplied by the same company. The roof pitches from the center and from the side walls, meeting in a valley above the column line between the 18-ft. and 25-ft. bays, at which point the roof drainage is carried down through conductor pipes alongside of the columns to a cistern. Under the trusses of the main bay a clearance of 19 ft. is provided and under the side bays approximately 16 ft.

The building framework consists of steel roof trusses carried on timber columns spaced longitudinally, on 10-ft. 3-in. centers in order to provide a sufficient number of bearings to insure a stiff line shaft. A 2-15/16-in. line shaft is used, all hangers are mounted with bolts rather than lag screws, and the countershafts are hung from an I-beam and channel overhead framework in a manner providing rigidity yet admitting of easy adjustment.

The interior of the shop is finished with a unique attention to color scheme for its effect upon the general lighting of the shop and the eyes of the workmen. The roof, trusses and columns are cov-

ered with paint of a light blue shade, while the top 3/8-in. dressing of cement on the floor has a soft red tinge. The Dunham vacuum system with overhead piping fed from a low-pressure boiler heats the shop. The general illumination is taken care of with 400-watt nitrogen-filled Mazda lamps spaced on 20-ft. centers.

The principal machining operations involved in the work of this shop consist of the turning of driving shafts and axle spindles on engine lathes and the machining of malleable iron and steel castings on turret lathes. Practically all of the latter is chucking work. Supplementing this are the usual miscellaneous milling and drilling operations. For the lathe work some 52 tools are installed in sizes from 14-in. to 20-in., about equally divided between American Tool Company and Lodge & Shipley machines. The turret lathe equipment is one of the largest installations of any one single type of turret lathe, and consists of 41 Warner & Swasey machines in sizes up to No. 3. In the arrangement of the tool equipment on the shop floor, the turret



The Works of the Clark Equipment Company, Comprising the Cellar



The Cleaning Room of the Electric Steel Foundry

lathes are grouped in the 25-ft. bays, on the side of the building at which the rough stock enters, and the engine lathes in the 25-ft. bay on the other side. In the center bay miscellaneous tool equipment is to be located where a more liberal spacing of the tools for a freer handling of the larger pieces is necessary. The machines are driven in groups from overhead motors, the current for which is purchased.

Cutting compound is also supplied to the machines in groups. There are no individual tool pumps. The compound is stored in two cisterns located under the floor, from which it is piped through floor conduits to each machine, returning in similar pipes to the cisterns. The flow of compound is actuated by centrifugal pumps driven from the line shaft. The necessary water is obtained from the 10,000-gal. cistern, in which the soft water draining from the roof is collected.

The narrow bays on either side of the shop, except for a section at one end where the assembling is done, are used for raw stock as it comes into the

machine shop from the rough material storage and receiving room, and on the other side as a stock room for finished parts. The finished stock room is suitably inclosed and all of the finished parts which are not partial assemblies or too big to be so handled are stored in steel bins furnished by the Lyon Metallic Mfg. Company. All parts going through the shop are machined on stock orders on a quantity production basis.

As a check upon the available supply of materials, an interesting device has been adopted in the finished stock room which visualizes the conditions from day to day. A large board is provided with rows of small pegs suitable for displaying cardboard tags about $1\frac{1}{2}$ in. square. Duplicate tags are provided in three colors, each color representing a certain part as in rough stock, in process of manufacture, or as finished stock. When a supply of a certain part is received into the rough stock storage, a tag of one color is hung up on which the number of the part and the quantity received are indicated. When an order is issued in the shop for



Tool Plant and, at the Right, the Buchanan Electric Steel Plant

the machining of a quantity of this particular part, the workman's order, which also becomes his time record, passes through the office and to the finished stock keeper, who then replaces the first tag with another showing the reduction in rough stock supply and hangs up on the same peg a tag of another color indicating the number of pieces in process of manufacture. When these parts come in to the finished stock, a third tag is hung up showing the number of pieces in stock and a correction is made of the number in process.

Except for the left-hand end of the board, the tags are arranged in a natural grouping with reference to their assembled relation, so that the stock keeper can readily pick out the tag for any particular part. The left-hand section of the board is reserved for the tags corresponding to parts the supply of which is dangerously low, and in general the relative position of all tags on the board with relation to the left hand end is an indication of the quantity available. Each day the purchasing department is advised concerning the shortage of all parts requiring to be replenished. A general glance at this board gives to the production manager a fairly accurate idea of the state of affairs in the shop.

In the manufacture of its initial product, the work of the Clark Equipment Company is likewise decidedly interesting. A full line of drills is manufactured from the flat twisted to the four-fluted drill, straight, taper and twisted reamers, countersinks and similar tools. In the manufacture of all this variety of drills the only machine operation, aside from grinding, is the milling of the tang on the end of the taper shanks.

All of the drills are forged. The forge shop is equipped with helve hammers and oil-burning heating furnaces. For twisting the drills a multiple disk clutch, mechanically operated, has been devised which grips the drill passing through its center throughout the length of the twist, each successive disk turning through a fractionally greater part of a revolution corresponding to its position along the length of the drill. Other furnaces are also provided for the heat treatment of the drills and the brazing on of taper shanks. Other shanks are electrically welded to the stock to be twisted before it is forged.

Except as the flat twisted drill with a beaded shank requires a few less operations than are necessary to the manufacture of the taper shank drill, the manufacture of a four-fluted drill is approximately the same as that of an ordinary high-speed twist drill. In the case of the high-speed twist drill, an ordinary carbon shank is electrically welded to a round bar of high-speed steel, which after being heated is then forged to a suitable flat and twisted. For the three or four-flute drill, instead of round stock, high-speed bars of three or four-point cross section are used. Reamers are similarly fashioned from corresponding stock, according to the number of flutes.

A wet grinding room for the rough grinding, and a dry grinding room for the finished grinding, both with Norton grinding machines, provide the equipment, with the exception of the milling machinery referred to, for the complete finishing of the forged drill.

Associated with the drill manufacturing departments is a large machine shop which constituted the original axle finishing department and which has also taken care of the machining of the castings from the steel foundry. In this shop, more than in any other department, the interweaving of the shop operations of the associated industries represented in the steel foundry, the forge shop

and the axle shop, are indicated and the logical features of the merger from an operating standpoint emphasized.

The steel foundry, through several stages of expansion, now occupies a building about 320 ft. long. Throughout its length it is traversed by a 5- and a 10-ton crane. The operation of this foundry, in the arrangement of its equipment and molding floors and in the "drive" with which its melting equipment, sand blast and cleaning departments are handled, indicates an emphasis upon production rather than elegance. At present the larger of the two electric furnaces is operating on a basic lining and the smaller with an acid lining. In the near future it is expected that only acid steel castings will be made, the supply of low-phosphorus scrap being amply plentiful to warrant.

The principal product of the foundry is the steel wheel previously mentioned, which is made in various sizes up to that required for 6-ton trucks. The wheels have a diameter of about 36 in. with a width of tread varying from 5 to 10 in. Yet the section of metal is so reduced by means of cores throughout the entire body of the wheel that the heaviest wheels weigh only about 600 lb., or about the same as the wood wheel. The thinness of the metal section and the necessity of its being uniform require the greatest accuracy both in the making of the mold and in the setting of the cores. Both cope and drag molds are rammed on jolt ramming machines. Molding machine equipment of similar type is also used for all of the other standard work of the foundry, hand molding being confined almost entirely to such jobbing work as is still being cared for.

The molds that have been poured are brought to a point near the annealing oven, which is of the car type, to be shaken out. The used facing is then returned by means of the crane and grab bucket to the mixer for retempering and preparation for further use. Facing prepared for the molds is carried from the sand mixer to the molding floor by the crane in bottom-dump buckets. Much of the success of the foundry in producing good castings is attributed to a thorough investigation of facings and the determination of the proper mixture for this particular work.

Employee Participation and Wage System

In all of its departments the company has especially endeavored to create an interest on the part of all employees in the business. This has not so much taken the form of putting some form of premium upon continuous service, but rather in developing a basis of common interest through ownership of stock in the organization. In the way of participation in profits, employees are invited to buy the stock of the company, which is on a 6 per cent basis. To employees an additional return of 6 per cent is guaranteed and the company agrees to buy the stock back at any time, paying 5 per cent on the money invested for the period of its investment.

In the matter of wages, a premium plan has been adopted. Wherever possible the work is put on a piece-rate basis. At the time of setting the tasks on which the rate is based, the company was fortunate in having had an unusually low scale of day wages. This afforded opportunity of instituting piece rates and premiums upon a liberal plan. As the standard task for various operations, the weekly production under the then-existing daily wage payment was adopted, and the permanence of the rate, obtained by dividing production into weekly wage, was guaranteed. For machine work, the operator is given 60 per cent of the rate as a

premium for excess production, while for hand and assembly work the employee gets the entire 100 per cent. In the case of the machine operator the withholding of a portion of the rate on excess production is for the obvious purpose of covering increased depreciation and increased use of materials.

Coke as a Boiler Fuel in England

A further step in the development of the coke market in London is the announcement that the Highways Committee of the London County Council has placed an order for 8 coke-burning mechanical stokers for use under the steam boilers at the Greenwich generating station. It is believed that this method has passed the experimental stage in more than one power station, but the London County Council will doubtless regard this new installation as partly experimental. The maximum consumption capacity of the 8 stokers is estimated at 100 tons of coke per 24 hr. The present consumption at the power station has been put at 165,000 tons per year, at 32s. per ton.

The London Coke Committee points out that, in view of the huge surplus of coke available in London before the war, the financial advantages which should accrue to the Council by equipping their boilers with stokers, which open the door to this alternative source of fuel supply, should be considerable, while from a national point of view the advantages accruing from the policy of using coke instead of coal to the extent indicated are no less important and far-reaching in their incidence in view of the abnormal and increasing cost of imported raw materials used in the manufacture of carburized water gas, a commodity which, however desirable and useful in normal times, is now regarded as expensive from more than one point of view. Based upon the total yearly consumption, which is by no means the largest of any individual power station in London, the valuable residuals which would be recovered by diverting this quantity of coal through the gas works would include 1650 tons of sulphate of ammonia, 300 tons of high-explosive material, and 1,650,000 gal. of coal tar.

Tests of Arc-Welded Stellite Cutting Tools

The Haynes Stellite Company, Kokomo, Ind., has developed a line of lathe, boring mill and planing and shaping machine tools of the arc-welded type. The tool consists of a drop forged, heat treated shank made from 0.45 to 0.55 carbon steel with a Stellite cutting nose welded in place. The tools are made in all the standard sizes with straight, right and left hand shanks. A number of tests of these tools have been made recently. In a series of three on cast steel gear wheels and blanks a $1\frac{1}{4} \times 1\frac{1}{4}$ in. tool with a No. 2 Stellite inlay was used in a boring mill. In two of the tests the work was completed in 8 hr. 35 min. and $4\frac{1}{4}$ hr., as compared with 18 to 20 and 9 hr. respectively with high-speed steel tools. In another case the hub and inside surface of the rim of a cast steel gear wheel was turned in $16\frac{1}{2}$ min. as compared with 26 min. for high-speed steel. The increase in production revealed by these tests ranged from 60 to 150 per cent. In another test in which the cast steel bedplate of a steam shovel was bored an approximate increase in production of 100 per cent was secured. This was the result of three tests, two of which were with a surface speed of 63 ft. per min. and the third at 180 ft. The feed in the first test was 0.022 in. per revolution of the spindle and 0.035 in. in the other two. The depth of cut taken in the first two, which were roughing cuts, was $\frac{1}{8}$ in. and $1/16$ in. for the finishing cut.

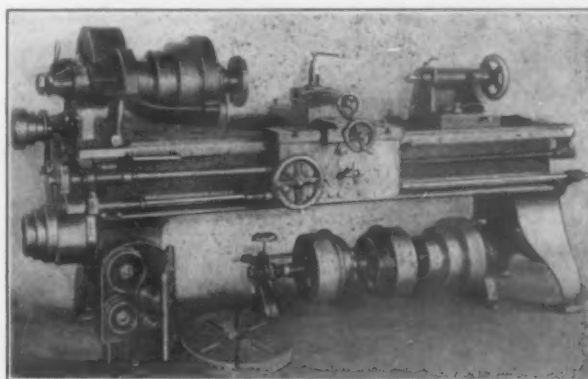
A course of lectures on business administration is to be given by the Wall Street Branch of New York University. The course covers seven lectures in all, by Dr. Edward D. Jones, professor of commerce and industry, University of Michigan, and will be held on Monday and Friday afternoons from 4.30 to 5.30 p. m. beginning Jan. 8 in the assembly room of the New York Merchants Association, Woolworth Building, New York. A fee of \$15, including the cost of books used, will be charged.

New Line of Heavy-Duty Engine Lathes

The Carl G. Westlund Company, Worcester, Mass., has recently begun the building of engine lathes in addition to its well-known line of clutches. The largest size now being made is an 18-in. heavy-duty lathe. This size has double back gears and a three-step cone pulley. A 14-in. size is made which is practically of the same design except that it has a single back gear.

The spindle is of crucible steel and has a $1\frac{1}{4}$ -in. hole. The spindle runs in bronze bearings, the front one being $2\frac{3}{4}$ in. in diameter and $5\frac{7}{16}$ in. long and that in the rear $2\frac{1}{8}$ in. in diameter and $4\frac{1}{4}$ in. long. The lead screw is $1\frac{7}{16}$ in. in diameter and of 4 pitch. The feed rod is $1\frac{1}{4}$ in. in diameter and is equipped with an automatic stop. A compound gear and belt feed provides for six changes in feed and the belt is tightened by a device of the usual type.

The apron has double bearings for the gear studs and knobs of different types help to distinguish the cross from the longitudinal feed. A taper attachment is provided which has the usual facilities for micrometer adjustments and is arranged so that the



One of a New Line of Heavy-Duty Engine Lathes That Is Built with Swings of 14 and 18 in. and Single and Double Back Gears

screw at one end gives tapers of $\frac{1}{8}$ in. per ft. and the screw at the other end gives a $1/10$ -in. taper. The tail end of the lathe is open so that the tailstock can be removed without taking off the clamps.

The larger size of lathe is made in 8, 10 and 12 ft. lengths and swings 20 in. over the bed. The 14-in. lathe is made in 5 and 6 ft. lengths and swings $16\frac{1}{4}$ in. over the bed. The smaller size will cut threads from 3 to 36 per in. including an $11\frac{1}{2}$ pipe thread, and the larger size cuts threads from 3 to 24, including the pipe thread.

Prize Contest for Engineering Papers

Winners of a prize contest for engineering papers, written by undergraduates and recent graduates of technical colleges and universities, are announced by the Engineers' Subdivision of the Chicago Association of Commerce as follows:

First prize, \$50, awarded to Harvey T. Hill, Field Museum, Jackson Park, Chicago, graduates of Pennsylvania State College, 1915. The subject of Mr. Hill's paper was "Engineering and Civic Progress."

Second prize, \$30, awarded to Leo Shippy, 2903 West Street, Ames, Iowa, mechanical engineer junior at Iowa State College, who wrote on the subject of "The Engineer of the Future."

Third prize, \$20, awarded to H. M. Kistler, 6737 Penn Avenue Pittsburgh, graduate of Pennsylvania State College, 1916, his subject also being "The Engineer of the Future."

Eleven universities were represented by those who submitted papers in the contest, which was announced in September. Honorable mention was given to the papers prepared by R. D. Stitt, Chicago, graduate of the University of Illinois, 1915, on the subject of "The Business Relation of the Engineer to the Commercial World," and Gordon D. Cooke, Detroit, graduate of the University of Michigan, 1916, on the subject of "Charting Rocks and Reefs on the Great Lakes."

Rates of Depreciation and Their Treatment

What a Cost Conference of Conveyor Builders Agreed to—Proper Disposition of the Depreciation Charges

BY CHARLES PIEZ

The table of standard depreciation rates adopted by the conveyor manufacturers cost conference, which appeared in connection with the article on "Perpetual Inventory and Appraisal Values" published in THE IRON AGE of Nov. 30, 1916, was offered as evidence that manufacturers can agree on a schedule of depreciation and can arrange a uniform method of making depreciation a component part of the cost of the product.

The table, which is reproduced herewith, offers the choice of two schedules—the first representing a definite percentage of depreciation on the original cost; the second representing a percentage of depreciation computed on the reducing, or depreciated balance. The two schedules are offered as substantial equivalents based on an assumed life of each class of items. The assumed life was determined by the members of the conference, many of whom had been in active business for more than twenty-five years, and had had considerable experience in the depreciation of buildings and equipment, resulting from wear and tear, from obsolescence, from the development of newer and more economical forms, or from inadequacy to meet the expanding needs of the business. The assumed life is not, therefore, mere conjecture, but has behind it long experience fortified by actual records. The rates are conservative because it would be unfair to assess excessive depreciation against costs.

The rates provided under the "Per Cent on Cost" schedule extinguish the entire cost at the end of the assumed life, while the equivalent rates under the "Per Cent on Reducing Balance" schedule are supposed to bring the items to a scrap value at the end of the same period.

In the case of small tools, punches and dies, chills and flasks, fixtures and furniture and patterns, only the additions actually made for the purpose of fabricating standard product are to be inventoried: these are to be depreciated as indicated under the "Per Cent on Cost" schedule, and are thereupon to be subjected to no further depreciation. Care must be exercised particularly in these items that all replacements are charged to maintenance and all other obsolete items are charged off entirely.

These items rarely have much cash value upon sale or liquidation, and care must therefore be exercised to prevent inflation of values in their inventory. An occasional check by actual count and a re-appraisal of the value of the active items on the basis provided in the schedule of depreciation are strongly advised.

In order to compare the two schedules presented by the table, a standard depreciation sheet for a 34-in. boring mill, developed first on a straight rate of depreciation of $4\frac{1}{2}$ per cent on the original cost, and immediately below on a 10 per cent rate on the reducing balance, is given herewith.

Reproduction of a Standard Depreciation Sheet for a 34-in. Boring Mill, Made Out on Both the Original Cost and on the Reducing Balance

EQUIPMENT INVENTORY

Name of item 34" Boring Mill		Made by Machine Tool Co. Shop No. 183												
Bought of Machinery Equipment Co.		Bought Jan. 1, 1894 Acct. 40360 Dept. DM												
Inventory value computed on percent of original cost.														
Rate of depreciation, - 4.5% on tool, 20% on installation.														
1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905														
12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31-														
Net Net Net Net Net Net Net Net Net Net Net Net Net														
Value Value Value Value Value Value Value Value Value Value Value Value Value														
34" Boring Mill with turret heads and 3-jaw chuck in table per specifications detailed in purchase order B-2592, Cost \$1318.00		1258.69	1199.38	1140.07	1080.76	1021.45	962.14	902.83	843.52	784.21	724.90	665.59	606.28	
Depreciation 4.5%														
1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916														
12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31-														
546.97 487.61 428.35 369.04 309.73 250.42 191.11 131.80 72.49 13.18 0.00														
1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905														
12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31-														
Cost if installation \$72.59		58.07	43.55	29.03	14.51	0.00	--	--	--	--	--	--	--	
Depreciation 20%														
Inventory value computed on reducing balance.														
Rate of depreciation, - 10% tool, 20% on installation.														
1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905														
12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31-														
Net Net Net Net Net Net Net Net Net Net Net Net Net														
Value Value Value Value Value Value Value Value Value Value Value Value Value														
34" Boring Mill as above \$1318.00		1186.20	1067.58	960.82	864.74	778.27	700.44	630.40	567.36	510.62	459.56	413.60	372.24	
Depreciation 10%														
1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916														
12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31-														
335.02 301.52 271.37 244.23 219.81 197.83 178.05 160.25 144.23 129.81 116.83														
1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905														
12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31-														
Cost of installation \$72.59		58.07	46.46	37.17	29.74	23.79	19.03	15.22	12.18	9.74	7.79	6.23	4.98	
Depreciation 20%														
1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916														
12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31- 12-31-														
3.98 3.18 2.54 2.03 1.62 1.30 1.04 .83 .66 .53 .42														

A New British Electric Steel Furnace

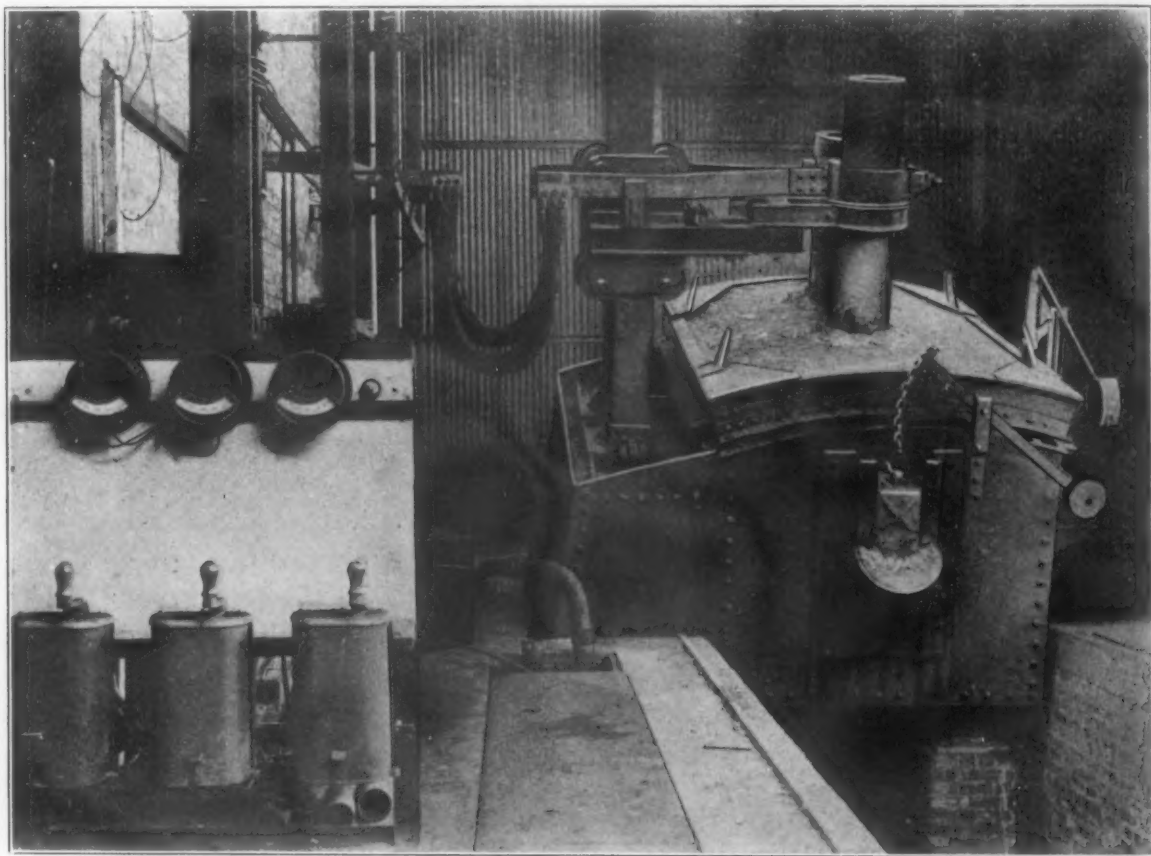
The Greaves-Etchells, a Sheffield Product, Operates on Three-Phase Current—The Special Features and the Metallurgical Advantages Claimed

A NEW type of electric steel furnace has made its appearance in the British steel industry. It is the Greaves-Etchells, named from the two designers: H. A. Greaves, one of the electrical engineers for the Sheffield Corporation, who has installed electric furnaces of various types in Sheffield, and H. Etchells, who has operated electric furnaces and produced alloy steels for various Sheffield firms.

The furnace was originally designed to meet the requirements of the Sheffield steel industry,

as by two or more top electrodes. Three-phase current is employed and three single-phase transformers are connected with meshed primaries. The secondary windings are connected in an unequal star, one leg of which is joined to the bottom electrode and the other leg to the top electrodes. The claims made for this system are:

1. That the proportions of the unequal star are so calculated as to give a balance on the primary supply phases when the upper electrodes are in equal adjustment.



A 3-Ton Greaves-Etchells Electric Steel Furnace Partially Tipped as in Tapping. Showing Electrical Connections

particularly the manufacture of high-speed and high-grade alloy steels. The Furnace Construction Company, Sheffield, which sells the new furnace, states that the first one, which was designed to melt 5 to 6 cwt. of high-speed steel in 3 hr., has already melted over 600 consecutive heats, and that on a recent short day shift five heats of 7 cwt. per charge of 18 per cent high-speed steel were melted. The longest time occupied from charging cold raw material to finished ingots was 1 hr. 40 min., and the shortest time 1 hr. 15 min. The current consumption is stated to have been about 700 units per ton.

The system consists in applying bottom heat to the furnace by means of a bottom electrode and also in creating such electro-magnet effects that the bath of molten metal is continually in circulation. This is accomplished by changing the ordinary type of arc furnace in such a way that energy is supplied through a conducting hearth as well

2. Considerable electrical advantage, in that if one arc is broken the others are not affected and any current overload passing through any arc must traverse two transformers in series and in different phase, thus giving a considerable buffer effect and tending towards a reduction of shock and the maintenance of a steady load. Continuous load can thus be maintained with very little variation either up or down, insuring the full capacity of the transformer being employed.

Among the metallurgical advantages are the fact that the steel is uniformly heated, the intense heat of the arcs being constantly absorbed by a moving stream of metal. By a slight displacement of the primary phases, the currents passing through the furnace bottom and between the top electrodes can be altered over a wide range. This is accomplished by means of tapplings on the primary windings of the transformers which alter the relative secondary voltages. The net result of this application is that the heat may be distributed in greater

or lesser proportion to the top and bottom of the charge. The slag may thus be superheated over the steel, as in the Heroult furnace, or complete uniformity of temperature between slag and steel may be maintained, no cold bottom being encountered.

The furnace hearth itself is made of a conductive mixture of magnesite and dolomite, which acts as the bottom electrode, and is not penetrated by water-cooled studs. The thickness of the hearth is kept at 20 in., insuring a safe container of liquid steel.

The furnace is made in three standard sizes, 10 cwt., 30 cwt., 3 tons and 6 tons. The illustration shows one of the 3-ton furnaces in operation in Sheffield. The 10-cwt. size has been specially designed to produce small ingots of high-speed and other alloy steels such as magnet steel and rustless or stainless steel. It is equipped with 260 kva. of power; the 30-cwt. furnace with 520 kva.; the 3-ton furnace with 800 kva., and the 6-ton furnace with 1560 kva. While each of the others has only two upper electrodes the 6-ton furnace is fitted with four such electrodes.

In the smaller sizes the furnaces are rectangular in shape and tilt endwise. The 6-ton furnace is circular. All are balanced and mounted on compensating rollers so that the teeming spout travels downward in a vertical line, enabling the ladles to be held in one position while tapping. A slagging spout is provided at the rear charging door and in the smaller sizes another charging door is placed at one side. There is a smaller door over the tapping spout.

The electrodes are carried by brackets on the blank side of the smaller furnace. In the 6-ton furnace the four electrodes are evenly distributed with a charging door each side of the furnace 3 ft. wide. These may be used for automatic charging and are sealed up with the company's patented plug type of door. During the heat the charge is worked from the back door. In this size of furnace the electrode arms are constructed to swing outward, allowing the roof to be lifted clear for changing and also permitting the electrodes to be changed without the necessity of a man climbing over the roof. Hoisting of the electrodes is effected by a threaded shaft which can be hand or motor-operated by a clutch. Automatic regulators are provided if required.

The transformers are of the Berry type of shell transformer. Reyrolle switch gear is employed and voltage selection is made by means of a rotary selector switch, the construction of which varies according to the customers' demand.

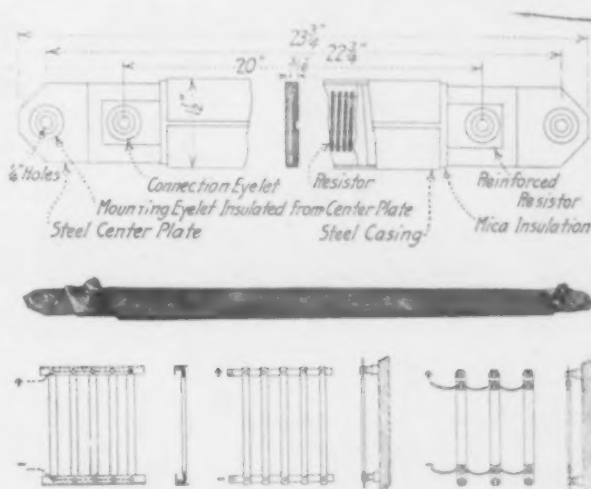
Two working voltages are usually provided except on the 10-cwt. furnace, which has only one uniform voltage. The necessary ammeters, current transformers and trip gear are provided, together with all electrical connections on the furnace side of the main oil switch. Electrical motors are employed for electrical hoisting and for tilting, and they are all interchangeable, but the 10-cwt. furnace is entirely operated by hand-gearing. The Greaves-Etchells system is protected, including various mechanical improvements here mentioned.

The company states that it is building a number of larger furnaces and that it has one 3-ton furnace already running, giving good results. Twenty furnaces are operating or under construction in England and others will be erected as soon as the British ministry of munitions is able to give its consent. All the furnaces are engaged on war work and the more urgent are being erected first.

Electric Heater Unit for Crane Cabs

The inclosed steel-jacketed heater unit built by the Cutler-Hammer Mfg. Company, Milwaukee, Wis., has been adapted to a number of industrial heating applications. These include the heating of crane cabs and the floor in the vicinity of shears and roller tables in steel plants. These units are designed to take the place of grid resistance banks which on account of their dimensions, it is pointed out, are sometimes not suited to the work.

These units have a capacity of 500 watts and can be used with either direct or alternating current systems, the standard voltages being 115, 230 and 250. They measure 1½ in. in width, 3/16 in. in thickness and 2 ft. long, thus corresponding closely to a flat ruler. Insulated eyelet terminals are provided for mounting and it is pointed out that no assembly of parts is required so that the unit can be installed singly or in groups connected in multiple like a number of incandescent lamps. Only sufficient clear space is required in mounting to permit free movement of air, a number of suggestions being given in the accompanying sketches. As all the parts are inclosed the units are not damaged by mechanical abuse or vibration, the nickel chromium resistor which furnishes the heat being inclosed in mica, which in turn is surrounded by a



This Steel Jacketed Electric Heater Unit Which Is Employed to Heat Crane Cabs and Keep the Feet of Shearmen and Tablemen in Steel Plants Warm Can Be Mounted on Angle-Iron Supports That Provide Protection for the Connections

steel jacket. This double insulation is relied upon to prevent grounding and eliminate the fire hazard.

In steel plants the shearmen and tablemen frequently experience difficulty in keeping their feet warm. When the units are used for this purpose a heavy perforated metal plate is installed about 2 in. from the floor, the unit being placed in the air space between. In this way, it is pointed out, a current of warm air circulates up through the perforations and if desired additional units can be installed at other points for raising the temperature, it being emphasized that a minimum of space is required. Practically the same arrangement is employed in the crane cabs.

Safety in boiler rooms has come in for attention by the National Safety Council, Chicago, the latest issue of its periodical *Safe Practices* having to do with boiler rooms. An illustration shows a counterbalanced fire door hung horizontally and from the top and arranged to swing inward. Another illustration shows a way of lighting the water gage.

The Cook Railway Signal Company, Denver, Col., has been reorganized and the name changed to the International Electric & Signal Company. The headquarters are now located at 1102 Tower Building, Chicago, Ill. W. J. Cook is president of the company.

New Roofing Material of Molded Gypsum

The construction of the steel frame building which is to be occupied by the Walker Mfg. Company at Racine, Wis., for the manufacture of automobile parts, includes the use of a new type of roofing material supplied by the United States Gypsum Company, Chicago, and erected under the supervision of P. L. Battey, chief engineer of the Arnold Company. This material is a form of extremely hard, dense, structural gypsum, prepared in molds at the place where it is to be used in slab form. It is lighter in weight than some other roofing materials used in slab form, yet is designed to carry a uniformly distributed load of 50 lb. per sq. ft., with a factor of safety of four. Its light coloring is also found effective in shop interiors by reason of its reflector value.

In their usual form slabs can be molded at a rate of 300 sq. ft. per hr. Usually they are cast in T-sections, 15 in. wide and 8 in. deep, being 1½ in. thick

section under loads of 2200 to 2400 lb. or 200 to 218 lb. per sq. ft. of 0.034 and 0.070 in. Under a load of 3500 lb. small horizontal shear cracks appeared. In addition to its strength as related to its light weight, this material can be erected in all kinds of weather without special precautions, is non-conducting and non-condensing. It has been found to be an especially inexpensive type of fireproof roofing material.

Explosions of Oxy-Acetylene Welding Equipment

At a recent meeting of the West Coast Safety Engineers' Association, San Francisco, R. L. Hemingway of the Industrial Accident Commission of California, with headquarters at 525 Market Street, San Francisco, read a brief paper which mentioned the possibility of small amounts of hydrogen existing in the oxygen gas, particularly when obtained by the electrolytic process, due possibly to occasional reversing of



Slabs of Molded Gypsum of T-Section with Closed Ends Are Employed to Supply a Support for the Waterproofing Used in the Roof Construction of This Plant for the Manufacture of Automobile Parts

in the slab and 2½ in. thick in the rib. The ends are closed with diaphragms 2 in. thick. They are reinforced by two ¾-in. rods in the bottom of the rib, one rod being bent up at the ends as a shear rod and looped to increase the value of the bond stress. In the slab the reinforcement consists of a steel wire mat of No. 14 gage and 4-in. mesh. Slabs taken from the molds 15 min. after being poured are firm enough at the end of 3 hr. to be walked upon. Slabs may also be cast in I-section form when a continuous flat ceiling effect is desired rather than a ribbed or beam ceiling. The weight of T-beam slabs is 16 to 17 lb. per sq. ft. and of I-beam sections, 22 lb. per sq. ft.

This type of roofing, known as Structolite, can be carried on light steel trusses where a saw-tooth roof is being covered and on steel purlins for flat roofs, the supporting steel being spaced on 10-ft. centers. The flat section of the Walker Mfg. Company's roof is pitched 1½ in. per ft. A tar and gravel covering over the Structolite is being used.

Tests of this material, derived from an investigation of five beams 24 hr. after pouring, showed a de-

the polarity of the electric terminals. At any rate, the Industrial Accident Commission has issued a warning to the public not to use oxygen gas for acetylene welding unless absolutely assured that it does not contain more than 2 per cent of hydrogen gas.

References in the paper were also made to the conditions surrounding the shipment of acetylene gas under pressure and the practice of prohibiting the use of containers which do not bear the stamp of the approval of the Interstate Commerce Commission. The author also told how the International Acetylene Association, realizing the difficulty of judging apparatus by simply a brief inspection, had submitted various forms of apparatus to the Underwriters Laboratories in Chicago for approval if meeting the standard of safety required. The author pointed out that it has been found possible to assist materially in the introduction of approved apparatus through the workings of compensation and workmen's safety acts and principally through the lower premium charged by liability insurance companies when approved apparatus is used.

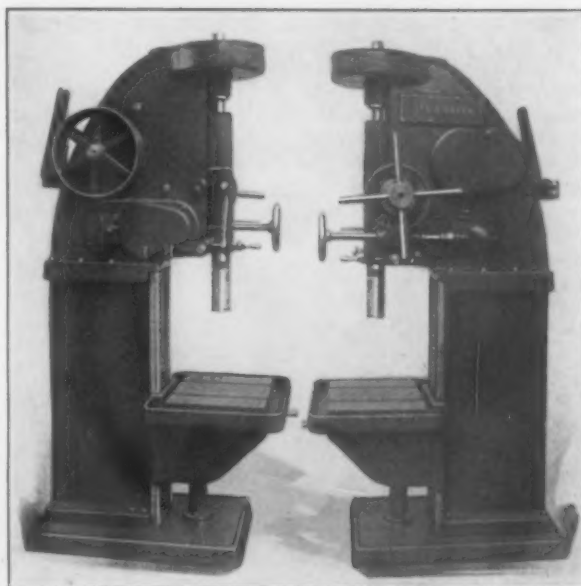
Heavy Manufacturing Drilling Machine

A single-purpose manufacturing drilling machine has been added to the line built by Baker Brothers, Toledo, Ohio. Although designed primarily for quantity production, the machine is flexible, it being emphasized that a wide range of work can be accommodated and the time required for making the changes is small. It is possible to arrange the machine for gang operation with continuous or independent tables and a wide range of feeds and speeds is available. Special attention has been paid to the concentration of the operating levers in a convenient location and ready means are provided for changing from drilling to reaming feeds.

The construction of the machine is rugged and simple. The spindle is a high-carbon steel forging and is fitted with the builder's special ball thrust bearing. The nose, which is bored for a No. 5 Morse taper, has a slot across the end that is relied upon to provide means for driving heavy boring and facing tools. The spindle sleeve has a bearing in the head for its entire length, which, it is emphasized, adds materially to the durability and rigidity of the machine. Hardened nickel steel is employed for the feed pinion and rack, and a safety shear pin is provided for the worm gear to protect the mechanism.

Change gears provide for speeds ranging from 76 to 614 r.p.m. and by changing the top driving gears it is possible to reduce the lower limit to 25 r.p.m., thus giving a total of 105 changes. These gears are guarded by a box cover and are easily reached for making changes, the removal of one gear and the substitution of another being accomplished in a short time and with little effort on the part of the operator. Change gears provide six feed rates for drilling or reaming, the change from one to the other being secured by a push rod placed at the left of the spindle. The range of drilling feeds regularly available is from 0.005 to 0.024 in. per revolution of the spindle, while the feeds provided for reaming have 0.020 and 0.089 in. as the limits respectively. Additional rates can be obtained by the use of gearing which is furnished as an extra.

It is explained that considerable study was given to the logical movements made by the operator in handling the different controlling levers which has resulted in grouping them in a convenient location. The shifting of a belt on tight and loose pulleys provides for the starting and stopping of the machine, a spring device being relied upon to hold the belt securely in either position. When the belt is thrown to the off position,



Changes in the Feed of This Vertical Heavy-Duty Manufacturing Drilling Machine from Drilling to Reaming Are Secured by the Push Rod at the Left of the Spindle, the Various Rates Being Obtained from the Change Gears Located Below and in Front of the Driving Pulley, while the Operating Means Are Grouped on the Opposite Side of the Column

a brake is applied to stop the spindle quickly and keep it from moving.

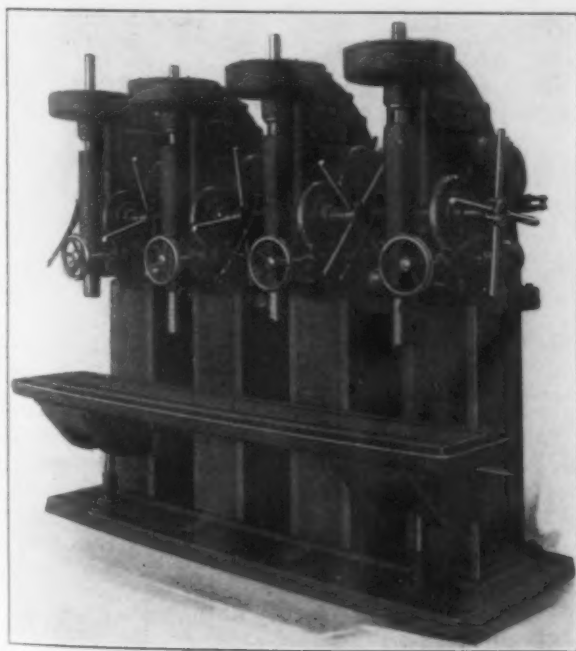
The machine is furnished as a one, two, three or four spindle unit, the floor space required ranging from 29 x 46 in. to 46 x 101 in. Each of the units has a separate single-belt drive and is entirely self-contained. Either independent tables for each spindle or a single continuous one can be furnished for the gang machines. Elevating screws serve to raise and lower the table, which has pockets for the cutting lubricant and is constructed so that it can be bushed to provide a support for a boring bar.

The distance from the center of the spindle to the face of the column is 10 in. and that from the end of the spindle to the plain table is 32 in. A feed of 12 in. is provided and the vertical adjustment of the table is 18 in. The weight ranges from approximately 2550 lb. for a single-spindle machine to 10,250 lb. for a four-spindle gang unit.

Nichrome Castings for High Temperatures

Castings of nichrome, intended to withstand temperatures of from 1000 deg. Fahr. up without corroding, pitting or oxidizing, are covered by a patent (U. S. 1,190,652) granted to John C. Henderson of Washington, D. C., and assigned to the Driver-Harris Wire Company, Harrison, N. J. The composition is 60 per cent nickel, 26 per cent iron, 12 per cent chromium and 1.5 per cent manganese. If substantially carbon free, under 0.40 per cent, the alloy can be machined, rolled or forged. The alloy requires a high melting heat, but can be cast in the ordinary manner. It is said to be suitable for incorporation into molds for die casting, valves and valve seats for internal combustion engines, crucibles, outer castings, annealing boxes, case-hardening or carburizing boxes and other apparatus. Manganese content is not essential. A slight film of oxide forms on the surface of the article under oxidizing conditions, which is said to be strong and durable and resistant to sulphuric and other acids and adheres strongly.

Norway is one of the chief producers of molybdenite. The two principal mines are located near Knabeheien, north of Flekkefjord. Their combined output of concentrate, averaging 75 per cent of MoS₂, was 72 tons in 1914 and 87 tons in 1915. The success of these two companies and the demand for molybdenum has resulted in the formation of several new companies to exploit and develop surrounding claims. The two principal companies use the Elmore vacuum process.



Four of the Machines Arranged in a Single Gang with a Continuous Table

Planing Machine for Gears and Racks

The Bickett Machine & Mfg. Company, Cincinnati, Ohio, is marketing a new automatic gear and rack planing machine. Special claims are made as to its labor-saving qualities and high-speed production of cut gears and racks. The design of the machine is similar to that of a crank shaping machine, the difference being that the cutter ram has a continuous metal to metal bearing, and that the cutter does not overhang



The Operating Principle of This Gear and Rack Planing Machine Is Practically the Same as That of a Shaping Machine of the Crank Type

at any time but is backed by a massive well-gibbed carriage throughout the entire operation.

To avoid any possibility of vibration of the work, the spindle is mounted directly upon the massive bed of the machine. This spindle is of an unusually heavy type, turned and accurately ground all over, being 4 in. in diameter and 18 in. long, and the hole for receiving the work arbor has a No. 12 Brown & Sharpe taper. The steady arm for supporting the other end of the work arbor has a cleverly arranged adjustable center and is also mounted directly upon the bed of the machine. It is, as will be seen from the accompanying illustration, also of an unusually heavy type.

One of the principal and most original features of this machine is the fact that two cutters are used, one for roughing and one for finishing. These cutters work alternately using both the forward and return strokes of the cutter ram. The roughing cutter, which is of the general shape of the tooth to be cut, has a corrugated cutting edge. It is claimed that with the forward stroke of the ram, a cut of $1/32$ in. can be made. A quick change gearbox with a feed changing mechanism is provided, which can be regulated by moving the lever shown when a different speed is desired and without having to change the set-up.

The gear indexing mechanism is simply constructed, and the large worm gear on the work spindle only moves at the instant of the index movement, a lock-bolt system being used. This indexing mechanism and the quick return movement of the carriage are driven simultaneously by a friction clutch of the expanding ring type, which is operated by a cam and is adjusted for the depth of cut from the outside of the index box. The time required to index the work and return the ram to cutting position is only $1\frac{1}{2}$ sec. and this time is the same for any width of gear, as the mechanism is driven from a shaft which runs at a constant rate of speed.

With the driving shaft running at the normal speed of 800 r.p.m., the cutter ram can make as high as 150 strokes per minute, while the cutter feed is adjustable from 0 to $1/32$ in. per stroke of the roughing cutter. A gear blank with an outside diameter of 28 in. can be handled on the machine and teeth with a

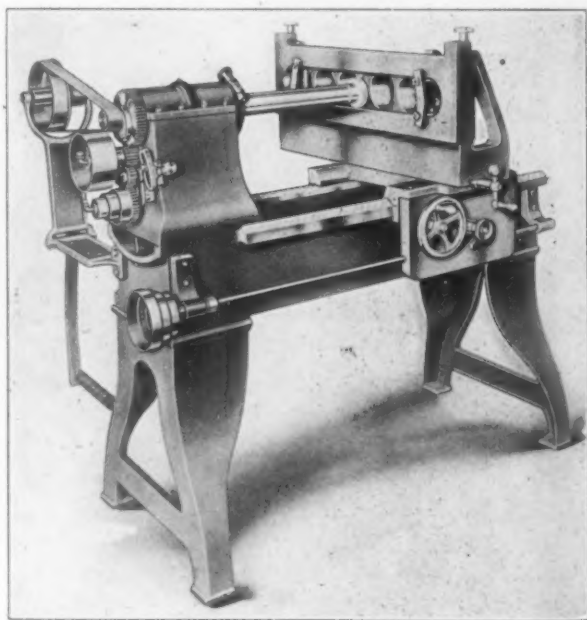
maximum 4-in. diameter pitch can be cut. The driving pulley is 10 in. in diameter with a $3\frac{1}{2}$ -in. face. The tank for the cutting lubricant in the base of the machine has a capacity of 40 gal. The net weight of the machine is 2800 lb.

Gas Engine Cylinder Grinding Machine

A regrinding machine, particularly suitable for the grinding of gasoline engine cylinders and by reason of its much lower cost as compared with machines of the manufacturing type, especially adapted to the needs of repair shops and commercial garages, is being manufactured by the B. L. Schmidt Company, Davenport, Iowa. The machines are of heavy construction, making them suitable for all classes of grinding within their range.

The bed is of the box-section type with a large V at the front and a flat one at the rear. The headstock is liberally designed for strength and rigidity and carries a spindle $4\frac{1}{4}$ in. in diameter by $9\frac{1}{2}$ in. long, insuring a true smooth surface in the cylinder. An oil pocket is cast in the center of the spindle bearing for a ring oiler. The carriage is gibbed front and back and has a bearing on the bed for its entire length. The cross slide, 22 in. long by 8 in. wide, has equally ample bearings affording a rigid support for the angle plate, bringing it square and in correct alignment with the spindle. The carriage is reversed through a pair of tumbler gears working from the gear on the driving pulley. The feed rod is driven through a belt connection from a three-step cone pulley, giving three changes of feed to the carriage.

The angle plate has a separate front plate fitted with two knurled knobs for raising and lowering it, thus facilitating the centering of the cylinder on the angle plate. A long slot is cast in the slide for clamping the cross-feed screw nut. This nut can be loosened, the angle plate pulled to any approximate position desired on the carriage, then clamped and the finer adjustments made with the cross-feed screw. The angle plate regularly furnished will handle all cylinders from the smallest motorcycle type to a six-cylinder block $31\frac{1}{2}$ in.



The Gasoline Engine Cylinders to Be Ground by this Special Regrinding Machine Are Mounted on the Angle Plate at the Right and Brought into Alignment with the Rotating Grinding Wheel

long. A complete set of separate plates with smaller or larger openings can be furnished, thus increasing the range of usefulness of the machine.

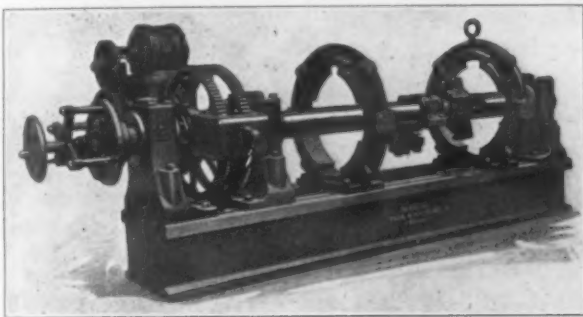
The countershaft attached to the bed of the machine and the emery wheel arbor are equipped with Hess-Bright ball bearings. The length of the bed is 55 in. and the width $15\frac{1}{2}$ in. The height from the bed to the center of the spindle is 12 in. and the floor space occupied by the tool 3 x 5 ft.

Machine for Boring and Facing Tubes

The Pedrick Tool & Machine Company, 3640 North Lawrence Street, Philadelphia, has brought out an interesting application of its portable cylinder boring bar. It is a complete self-contained unit combining drive, feed and length of travel and is adapted for other than strictly portable work; the latest use to which it has been put is a tube boring and facing machine. While this application was made primarily for the boring and facing of torpedo tubes, it is pointed out that it is equally applicable to work of a similar nature such as cylinders, liners, bushings, sleeves or whatever else can be held in saddles. One of the points upon which special emphasis is laid is that a long boring travel is obtained with a comparatively small machine, thus effecting economies in the amount of floor space and enabling the machine to be placed in any part of the shop as it is a self-contained unit.

The boring bar is supported in three pedestals at a fixed height above the bed, the design being such that spacing blocks can be employed to raise the pedestals if needed without interfering with the alignment of the bar or other mechanism. Bearings for the bar are secured by large bushings in the pedestals. The bar is revolved by compound gearing which in turn is connected through speed change gearing to an electric motor. If desired a belt drive can be substituted.

The cutterhead travels along the bar the same as in the builder's regular portable type of bar. An automatic reversible feed having three changes which are instantly available is provided. The heads have four arms for carrying that number of tools although



A Long Boring Travel Is Obtained in this Comparatively Small Machine for Boring and Facing Tubes, Cylinders and Similar Work That Can Be Held in a Saddle by Employing a Portable Boring Bar

it is pointed out that it is possible to secure good results with a single tool. In the accompanying illustration a facing arm is shown mounted on the bar for facing the flanges or ends of the tubes or cylinders.

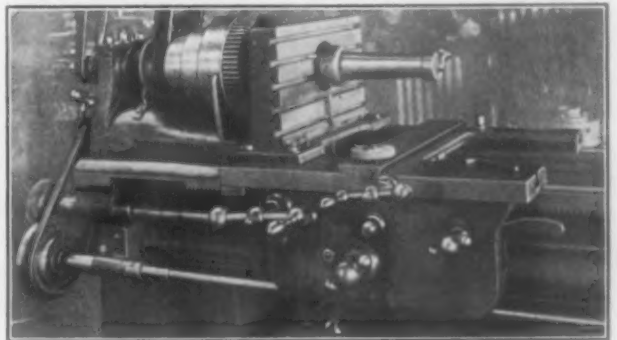
The saddles employed for holding the work are either plain as shown or furnished with four adjusting screws to take care of miscellaneous requirements. They are centrally located with reference to the fixed position of the bar, this arrangement being made possible by boring them out by the bar after it had been fitted to the bedplate. Like the pedestals supporting the bar the saddles can be moved along the bed and are held in place by studs fitting in two T-slots running the full length of the bed on both sides.

Making Skilled Artisans of Wounded Soldiers

Making skilled artisans for the various metal industries out of wounded soldiers is the object of a school opened in Düsseldorf, Germany. It is stated that before the war the men pursued all kinds of vocations in civil life. When they enter this school as convalescents the greater part of the day is spent in giving them theoretical instruction, but as they grow stronger, the lecture hours are gradually curtailed and the men receive practical instruction in the large workshop of the school where they do easy work on machine tools. The bulk of the machinery in the training shop is driven by an electric motor of 20 hp., but some are propelled by separate motors. The men easily find employment after finishing their training.

Cylinder Boring and Grinding Device

The John Gibson Company, 210 Drumm Street, San Francisco, Cal., has developed a lathe attachment for machining worn and damaged cylinders of internal combustion engines. The device is designed for placing on an engine lathe having a swing of 16 in. or more and it is emphasized does the work of a special cylinder grinding machine. In addition an arrangement for boring the cylinders is also provided which it is explained



The Boring Tool Mounted on the Spindle of This Combination Attachment for Remachining Worn or Damaged Internal Combustion Engine Cylinders Can Be Made to Travel in Circles of Varying Diameter by a Special Radial Adjustment and Can Be Interchanged with the Grinding Wheel Shown on the Lathe Carriage

enables a large amount of stock to be removed quickly preparatory to finishing the cylinder by grinding. A special feature claimed for the device is the radial adjustment provided for the head to enable various diameters to be operated on.

The head of the attachment screws on the nose of the lathe spindle in place of the chucks ordinarily employed. It consists of two parts, one for boring and the other for grinding, and is capable of being adjusted radially with reference to the axis of the lathe spindle. This causes the abrasive wheel or cutting tool to travel in circles of varying diameters corresponding to those of the cylinders being operated on. The screw controlling this adjustment is graduated to 0.001 in. The sliding joint is gibbed with a view to obtaining rigid construction and three screws are employed to take up looseness.

The grinding wheel is driven by a shaft through the hollow spindle of the lathe, the driving pulley being fastened to the end of the spindle. Flexible joints are provided for the shaft connecting the driving pulley and the grinding wheel to allow for deflection when the grinding head is offset. The boring head screws on the end of the attachment and it is emphasized that the time required to make the change from grinding to boring or vice versa is short. In addition to the rapid removal of the stock, the boring head can also be used for counterboring, chamfering, and cutting oil grooves. Taper roller bearings, which have an automatic adjustment for taking up wear, are provided for the spindle mounting. In this way, it is pointed out, play is prevented and accurate work is secured.

An angle plate is employed for holding the work. The plate has T-slots for clamping the cylinders in position and is located at the extreme left side of the carriage. A hole in the center of the angle plate is provided for the passage of the attachment.

An Ohio company, of whose product about 85 per cent. is sold to 5 and 10 cent stores in the form of toys and other products made of cast iron, is facing a tough problem. There has been so great an increase in the cost of manufacture that these goods can no longer be made and retailed at their present price; hence, either their manufacture must be discontinued or a way found to make the product cheaper.

The new sheet-mill plant that is being built as an extension to the works of the Massillon Sheet & Tin Plate Company, Mansfield, Ohio, will be equipped with six sheet mills, four roughing mills, eight stands of cold rolls, six double furnaces and four annealing furnaces.

The Heat Treatment of Chain Cables*

Results of an Investigation of the Procedure in Chain-Making to Discover a Method of Making a Stronger Product

BY W. W. WEBSTER AND E. L. PATCH

THE Government specifications for wrought iron for chain making are in substance as follows: Grade "A" must be of best quality, American refined iron, puddled from all-ore pig iron, and free from admixture of steel or scrap. The phosphorus must not exceed 0.10 per cent nor the sulphur 0.015 per cent.

The physical requirements are: Tensile strength, 48,000 lb. per square inch; yield point, not less than

analysis" of the iron, or the determination of its "critical" points.

Typical heating and cooling curves of the Burden iron are shown in Fig. 1. Table 1 gives the critical points as determined by these curves, and also, for purposes of comparison, the average critical points for pure iron, 0.10 per cent carbon and 0.20 per cent carbon, as taken from Sauveur's Equilibrium Diagram of Iron-Carbon Alloys.

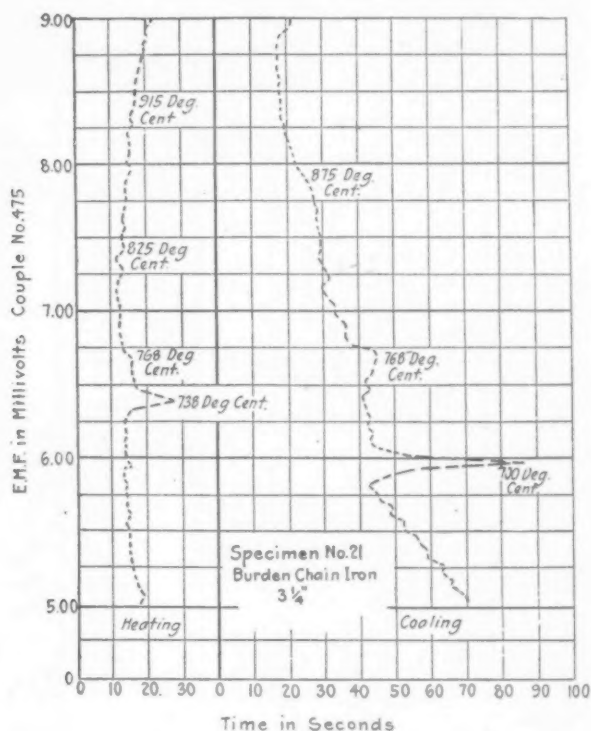


Fig. 1—Typical Heating and Cooling Curves for Burden Iron

one-half tensile strength; elongation, 26 per cent in 8 in.; contraction of area, 40 per cent.

Chemical analysis of Burden iron, made by the chemical laboratory of the Boston Navy Yard from borings taken from several stock bars, gave the following average results: carbon, 0.10 per cent; silicon, 0.10 per cent; phosphorus, 0.085 per cent; sulphur, 0.008 per cent.

Tensile tests of twelve tensile specimens cut from a 3 1/4-in. Burden stock bar showed the following results:

	Test results	Specification
Yield points, lb. per sq. in.	26,100	24,000
Tensile strength, lb. per sq. in. .	49,000	48,000
Elongation, per cent.	35.5	26
Contraction of area, per cent. .	50	40

Impact tests of eight Charpy specimens cut from a 3 1/4-in. stock bar averaged: Longitudinal, 150 ft.-lb. per square inch; transverse, 39 ft.-lb. per square inch. The difference of resistance to shock due to the direction of the slag fibers is here clearly shown.

Preliminary to tests upon specimens cut from the links of chain cables, a laboratory investigation was made of the effects of certain variables in the process of heat treatment upon the physical properties of Burden iron stock. This investigation included a "thermal

TABLE 1—CRITICAL POINTS FROM HEATING AND COOLING CURVES FOR BURDEN IRON

Critical Point	Burden stock		Av. of Heating & Cooling, from Equilibrium Diagram		
	Heating, deg. C	Cooling, deg. C	Pure Iron, deg. C	0.1% Carbon, deg. C	0.2% Carbon, deg. C
A ₁	915	875	900	850	800
A ₂	768	768	768	768	768
A ₃	738	700	690	690	690

The practical conclusion from the location of the upper end of the upper critical range on the heating curve at 915 deg. C. is that to anneal or air-quench the chain from above the critical range it should be heated to about 950 deg. C., instead of 890 deg. C., as has previously been the practice.

Laboratory Experiments in Heat Treatment

The preliminary study of heat treatment made in the laboratory was for the purpose of securing an indication of the best treatment to be used in the actual manufacture of the chain cable. In this investigation the attempt was made to find the effect of the following variables:

1. Maximum temperature of annealing.
2. Rate of cooling, or quenching.
3. Drawing to different temperatures after heating to maximum temperatures, or after different rates of cooling.
4. Time of annealing or time material is held at maximum temperature.

The heat treatments developed are as follows:

Series (a): Rate of Cooling

- 1 Heat to 900 deg. cent. and cool in furnace
- 2 Heat to 900 deg. cent. and cool in air
- 3 Heat to 900 deg. cent. and quench in oil
- 4 Heat to 900 deg. cent. and quench in water

Series (b): Rate of Cooling

- 5 Heat to 1060 deg. cent. and cool in furnace
- 6 Heat to 1060 deg. cent. and cool in air
- 7 Heat to 1060 deg. cent. and quench in oil
- 8 Heat to 1060 deg. cent. and quench in water

Series (c): Rate of Cooling before Drawing

- 9 Heat to 1000 deg. cent., cool in furnace, reheat to 900 deg., quench in oil and draw to 650 deg.

- 10 Same as (9) but quenched in water

Series (d): Maximum Temperature before Cooling

- 11 Heat to 800 deg. cent. and quench in water
- 12 Heat to 850 deg. cent. and quench in water
- 13 Heat to 900 deg. cent. and quench in water
- 14 Heat to 950 deg. cent. and quench in water
- 15 Heat to 1000 deg. cent. and quench in water
- 16 Heat to 1050 deg. cent. and quench in water

Series (e): Temperature of Drawing

- 17 Heat to 1000 deg. cent., quench in water, draw to 550 deg.
- 18 Heat to 1000 deg. cent., quench in water, draw to 650 deg.
- 19 Heat to 1000 deg. cent., quench in water, draw to 750 deg.

Series (f): Rate of Cooling

- 20 Heat to 1000 deg. cent., quench in oil
- 21 Heat to 1000 deg. cent., cool in air

Series (a) Repeated

- 22
- 23
- 24
- 25
- 26
- 27

Series (g): Time of Annealing

- 28 Heat to 970 deg., hold 1 min., cool in air
- 29 Heat to 970 deg., hold 15 min., cool in air
- 30 Heat to 970 deg., hold 30 min., cool in air
- 31 Heat to 970 deg., hold 120 min., cool in air

After the specimens had received their heat treatments the following tensile and impact tests were made upon the heat-treated specimens:

*From a paper read at the annual meeting of the American Society of Mechanical Engineers, New York, Dec. 8, 1916. The power forging process by which the cables forming the subject of the paper were made was described in THE IRON AGE, Dec. 14, 1916.

1. Tensile tests giving: (a) Yield point; (b) breaking stress; (c) per cent elongation in 2 in.; (d) per cent reduction in area from 0.20 sq. in. 2. Impact tests giving: Resistance to shock in foot-pounds per square inch of an area of about 0.0785 sq. in. in a bar 10 mm. square by 55 mm. long, with 40 mm. between supports.

The tensile tests were made at the Boston Navy Yard and the Charpy impact tests at Watertown Arsenal. The results of these tests are summarized in Table 2. Plots showing the effects of different rates of cooling, series (a), heated to 900 deg. C., and series (b), heated to 1060 deg. C., are given in Fig. 2.

Table 2—Results of Tests on Heat Treated Specimens

No. of Heat Treatment	Maximum Temperature	Cooling Media	TENSILE RESULTS				IMPACT RESULTS	
			Yield Point	Breaking Stress	% Elong. in 2 in.	% reduction of Area from 0.2 sq. in.	Charpy Impact Results	Long. Trans.
Specifications:			24,000 ($\frac{1}{2}$ Breaking Strength)	49,000	26 (in 8 in.)	40		
Untreated material:			26,800	49,900	30	50	150	30
Series (a): Rate of Cooling								
22	900	Furnace	23,465	46,965	35.2	56.4	93	46.9
23	900	Air	32,365	51,230	34.8	45.2	225	46.1
24	900	Oil	41,400	57,050	31.4	48.4	336	52.5
25	900	Water	49,275	69,720	24.7	41.7	408	43.8
Series (b): Rate of Cooling								
26	1060	Furnace	26,700	47,280	36.2	50.0	89	41.0
27	1060	Air	31,230	49,780	36.0	49.0	234	45.2
7	1060	Oil	39,435	56,900	30.0	53.0	341	34.5
8	1060	Water	44,250	65,400	26.0	51.0	401	37.1
Series (c): Hardening and Drawing								
Draw. Temp. °C.								
24	900	Oil	41,400	57,050	31.4	48.4	336	52.5
9	900	Oil	32,900	50,235	29.0	50.0	299	50.9
25	900	Water	49,275	69,720	24.7	41.7	408	43.8
10	900	Water	31,625	49,450	28.0	50.0	264	46.6
Series (d): Maximum Temperature Before Cooling								
Water Quenched								
11	800	Water	46,105	68,250	19.1	41.4	240	29.3
12	850	Water	42,700	64,130	24.8	47.6	271	45.9
13	900	Water	45,815	62,880	28.3	49.4	371	33.8
25	900	Water	49,275	69,720	24.7	41.7	408	43.8
14	950	Water	50,615	69,860	23.0	51.7	335	33.7
15	1000	Water	48,835	67,125	26.9	54.3	263	37.5
16	1050	Water	45,720	63,130	25.9	53.9	280	37.5
8	1060	Water	44,250	65,400	26.0	51.0	401	37.1
Oil Quenched								
24	900	Oil	41,400	57,050	31.4	48.4	336	52.5
20	1000	Oil	41,750	55,705	34.6	54.6	385	49.3
7	1060	Oil	39,435	56,900	30.0	53.0	341	34.5
Air Cooled								
23	900	Air	32,345	51,230	34.8	45.2	225	46.1
21	1000	Air	33,385	49,515	36.6	55.8	268	43.1
27	1060	Air	31,230	49,780	36.0	49.0	234	45.2
Furnace Cooled								
22	900	Furnace	23,465	46,965	35.2	56.4	93	46.9
5	1000	Furnace	27,750	49,065	34.0	50.0	169	42.6
26	1060	Furnace	26,700	47,280	36.2	50.0	89	41.0
Series (e): Temperature of Drawing								
Draw Temp.								
15	1000	Water	48,835	67,125	26.9	54.3	263	37.5
17	1000	Water	42,285	58,235	34.2	58.1	385	51.0
18	1000	Water	35,585	52,935	35.6	58.4	375	62.3
10	1000	Water	34,385	49,535	39.4	57.4	305	49.5
Series (g): Time of Annealing								
Time at Max. Temp. Minutes								
28	970	1 Air	31,265	45,550	36.1	52.1	261	63.4
29	970	15 Air	32,200	45,300	37.4	53.3	262	63.2
30	970	30 Air	30,830	45,300	37.4	53.7	274	58.2
31	770	120 Air	20,890	48,480	37.8	53.1	330	57.7

The results of tests on the stock material before any heat treatment was given are shown by points on the left. It may be readily seen: (1) that furnace cooling reduces the Charpy and tensile strength and increases the elongation and reduction of area; (2) that air cooling gives greater strength than the original material with less elongation and reduction of area; (3) that oil and water quenching increase the strength considerably. The effect of the rate of cooling on series (b), in which the specimens were heated to 1060 deg. C., was generally less than in series (c), in which the heating was carried only to 900 deg. C.

The effect of tempering or hardening and drawing is shown graphically in Fig. 3. On the left is shown series (c), the effect of drawing to 650 deg. C. of specimens heated to 900 deg. C. and quenched in oil and water respectively. It is seen that the drawing brought the tensile breaking stress and elongation nearly down to the average untreated results, as shown in the left center of the sheet, while the per cent reduction of area was greatly increased over the average stock results, and the reduction in the Charpy longitudinal strength was very small.

On the right is shown series (e) all heated to 1000

deg. and water quenched, the abscissa being the drawing temperatures, with the results of the undrawn given at the extreme right for comparison. The general effect of increasing the drawing temperature is to reduce the strength and increase the elongation.

The effect of the maximum temperature of heating before water quenching, series (d), is plotted in Fig. 4. It appears from these results that a temperature of about 950 deg. C. would give the best results with water quenching, and any increase beyond 1000 deg. C. gives less strength, although the Charpy longitudinal specimens gave best results at 900 deg. C. and 1060 deg. C. The data of the oil-quenched and air and furnace-cooled specimens were not sufficiently complete to warrant plotting.

As a general conclusion from the results of the physical tests of heat-treated Burden chain iron, it may be stated that it is affected by heat treatment in a manner very similar to a low-carbon steel, giving an increase of 40 per cent in the tensile strength and 125 per cent in the longitudinal impact strength when heated to 950 deg. C. and quenched in water.

Preliminary Experiments with Chain Links

Two preliminary experiments were performed with full size chain, (1) to confirm the results of the laboratory experiments as to the best temperature to which the chain should be heated for annealing by air cooling, and (2) to determine the best sequence of annealing and proofing. Chain may be (1) annealed before

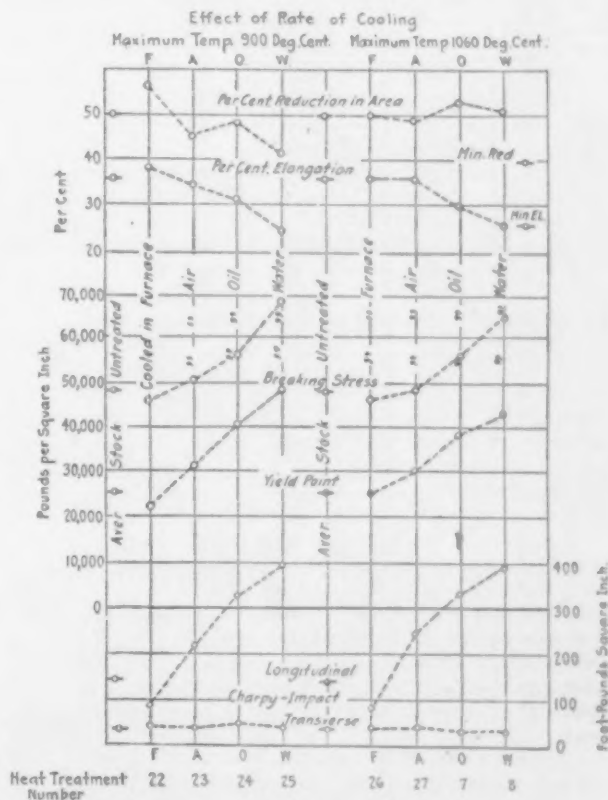


Fig. 2—Effects of Different Rates of Cooling. Specimens heated to 900 deg. C. and 1060 deg. C. cooled in furnace, cooled in air, quenched in oil and quenched in water. Results on untreated material shown vertically at the left and in the center. The diagrams in Figs. 3 and 4 show tensile results comprising per cent reduction in area, elongation, breaking stress and yield point, and impact results

proofing, which is the regular practice, (2) annealed after proofing, or (3) annealed before and after.

When chain is proofed, it is strained well over the elastic limit of the link as a whole. For example, $\frac{3}{4}$ -in. test links are proofed to 367,000 lb., which leaves a permanent set of about $\frac{1}{8}$ in. The ratio of proof to pulling load is $367,000:620,000 = 0.59$, while the ratio of elastic limit to ultimate stress of the material is $27,000:49,000 = 0.55$. Proofing therefore strains certain parts of the link above the elastic limit and leaves it in an internally strained condition. If method (1) is used the chain leaves the shop for service with internal strains, but if method (2) is used the internal strains of

proofing are relieved by annealing and from this consideration alone each link should be stronger. Method (2) of annealing after proofing, appears to produce the stronger link. On the other hand, four of the six test doublets of method (2) broke by failure of the weld before they were strained to their breaking stress. One of the best men in the shop forged all of the links for this experiment, knowing that they were for experimental purposes. This, combined with the fact that there was only one failure of the weld in the tests

to the great additional trouble and expense of two annealing processes for the slight advantage to be gained.

Effect of Welding and Annealing

It has been mentioned by Mr. Coburn that the "stiffness" of the first power-forged links was so great as to cause fractures and that this stiffness was removed by annealing. "Stiffness" is the customary expression for lack of ductility as regards the stretching or elongation of chain links. In order to explain the failure of these power-forged, unannealed links, and the way in which annealing restored their strength, it is important to understand the essential differences between hand and power forging.

The use of the steam hammer in forging enables a much greater reduction in area to be made at the weld, and produces a much greater amount of internal work. It also permits the use of a longer scarf, which necessitates a welding heat further around on the quarter of the link. In power forging, therefore, the link is brought up to a white heat well around on the quarter, and then shades off through light orange, dark orange, and bright red, to a dull red at the bent end. In hand forging, the white heat does not cover so large an area and shades down to a dull red on the side of the link, and to black on the bent quarters and end.

It would be expected that these conditions would permit a greater crystal growth of the power-forged chain, except under the hammer at the welded end. Since the welded end of the power-forged link receives a much greater amount of work from hammering, it should have a much smaller grain size than the hand-welded link at the finishing temperature. On the other hand, the power-forged link has a greater cooling range during which the crystals may grow, since its finishing temperature is higher; but most probably this effect is small in comparison with that of hammering. The net results should be an appreciably smaller grain size at the weld of the power-forged link.

In comparison with the other parts of the same link, the grain size at the weld should increase from the middle to the end of the weld as the hammering effect decreases, and then should decrease from the weld around to the bend and in proportion to the maximum temperature to which the part was heated. Hammering also deforms the crystals at the weld, but this effect should be obliterated by the crystal growth during cooling from 1200 deg. C. down through the critical range, after hammering has ceased, and there should be no resultant "strain hardening."

Carbon should have little hardening effect in either hand- or power-forged chains. Since there is no practical difference between the cooling conditions of the two, it should cause no difference between them in hardening.

The only remaining difference between the structures of the hand-forged and power-forged links which could cause the greater stiffness of the latter, is the grain size. In the side of the link where most of the stretching takes place, the grain size is probably somewhat greater in the power-forged link, while in the welded quarter, where the first power-forged links broke, the difference is probably not appreciable. According to Rosenhain, coarse structure generally does not affect tensile strength or ductility to a marked degree, although it does greatly decrease resistance to shock.

Therefore, theoretical consideration of the material as an alloy of iron and carbon only, shows no apparent cause for stiffness in the power-forging process. In the tests, however, it developed that in the power-forged link there was an overheated, distorted structure, which was relieved by the recrystallization in annealing. The stiffness of the link was undoubtedly removed primarily by relieving this condition, but also to some extent by the lessened hardening effect of carbon and the refinement of grain size caused by annealing.

In forging the links it is evident that underheating will produce a very weak pseudo-weld, but an experienced chain maker seldom underheats. Overheating above 1400 deg. C. will produce a coarse structure which it is difficult to remove by annealing, and, therefore, should be avoided. If the link is heated to the neighborhood of 1450 deg. C. it will be "burnt." This condition, which is not infrequent, cannot be removed by



Fig. 3—Effects of Hardening and Drawing. Specimens heated to 900 deg. C. and quenched in oil; and for specimens heated to 1000 deg. C. and quenched in water. Results on untreated stock material shown vertically at left center; results of quenching without drawing at extreme right

made for each of the other methods indicates that the failure of these four welds was due to the sequence of operations.

After four of the six doublets for method (2) broke through the weld, it was decided to run another series of tests on this method. Eight 2½-in. Burden iron doublets were made. Of the eight, two broke low with a dull, lusterless fracture, indicating overheating. The average of the other six was 504,000 lb., failing generally across the welded quarter with a fibrous fracture. In spite of careful welding, the point of the scarf in one link was found not welded when pulled to destruction.

These results were compared with results from tests on 2½-in. doublets annealed and pulled in the course of regular shop manufacture. These doublets were treated by method (1) by first annealing and then proofing.

The average pulling strength of six of these links was 482,000 lb., which, compared with the 504,000 of the links treated by method (2), shows that the latter process produces the stronger links, provided there is no injury to the weld due to the action of proofing on local strains.

Because this tendency to injure the weld does exist where method (2) is used, the conclusion was reached that method (1) of annealing before proofing should be followed and not method (2). Theoretically method (3) would seem to be much preferable to both (1) and (2), since it combined the advantages of each, but the average breaking load was the same as for method (1). The fractures, however, were remarkably clean, pure, and silky. There would probably be a small advantage in using method (3), but it is not practical to go

annealing and results in a weak and brittle structure, particularly when subjected to shock. Signs of slag running and collecting between grains is the characteristic indication of burning and can easily be detected under the microscope.

For the purpose of testing, a shot of five 3½-in. Burden iron links was forged in the regular manner and four of these were annealed. Specimens were cut from the unannealed link (designated as No. 1) and from one of the annealed links (designated as No. 2). The remaining three links were pulled.

At the time the tests were started it was the practice to heat the chain to about 890 deg. C. (52 m.v.) and this value was used throughout. The present practice, as previously stated, is to heat to 965 deg. The effect which this change might be expected to have on the results will be discussed later.

Results of Physical Tests

The results of the physical tests of the specimens are given in Table 3. In the third column are entered for comparison the results of tests on untreated stock material previously given. However, only a rough comparison can be made between these results and those from link 1, for the reason that in the link specimens there is a curvature of the slag grain with respect to the axes of the specimens, due to the curvature of the link. This curvature probably renders of no significance any difference under 10 per cent.

TABLE 3—TEST OF UNANNEALED AND ANNEALED LINKS

	Average Results		
	Link No. 1	Link No. 2	Stock Material
Yield point, lb. sq. in. . . .	27,900	26,600	26,100
Tensile strength, lb. sq. in. . . .	47,600	45,500	49,000
Elongation, per cent. . . .	37	38	36
Reduction of area, p. cent. . . .	51	55	50
Charpy tests, ft.-lb., sq. in.			
Longitudinal, quarter. . . .	85	122	.50
Longitudinal, side	90	176	
Transverse, quarter. . . .	48	41	.39
Transverse, side	41	52	

In comparing the results of links No. 1 and No. 2, the question of curvature is eliminated, as the specimens from both links were in the same condition. The fore-

A study of the grain size revealed that annealing has the effect of refining the grain size of the link, especially at the welded end. This gradation to a smaller grain size at the welded end shows that some effect from the smaller grains in that part before annealing still remains to produce a somewhat smaller grain after annealing in spite of re-crystallization.

Effect of Heat Treatment

The conclusion is reached that the stiffness of the unannealed link is largely due to the overheated distorted structure in the welded end. The fact that the metal of the forged link does not return to its normal condition during slow cooling after forging, even if it has been "overheated" to 1350 deg. C., is probably to a large extent due to the effects of slag and other impurities. Annealing relieves this condition by the process of re-crystallization, which practically wipes out all former structure and gives a finer and more normal grain size.

In regard to this overheating, Rosenhain says: " . . . We find that by 'overheating' steel, i.e., by exposing it to unduly high temperatures, or for too long a time at any temperature above A_c , the growth of a very coarse iron structure results, and this, on cooling, gives rise to a corresponding coarse ferrite-pearlite structure. Not only this, but the arrangement and forms assumed by the pearlite which is formed from such steel is characteristic; there is a strong tendency for the ferrite to take the form of straight bands with elongated and angular patches of pearlite between them, the ferrite bands frequently crossing one another, at angles of 60 deg. Such a coarse, sharply angular structure is, of course, extremely undesirable; there is a minimum of interlocking between ferrite and pearlite, and the straightness of the arrangement facilitates the propagation of slip or cleavage through the crystals. Such structures are, in fact, frequently met with in steel objects which have failed in service. Under test they generally exhibit some degree of weakness as regards shock and alternating stresses, but their tensile strength and elongation are frequently quite satisfactory. The most typical feature, however, is a decided drop in the yield point as compared with that of the same material in a more normal condition."

The above description fits exactly the structure which has been found in the carbon areas of the welded end of the unannealed link. In the results of the physical tests, it was seen that the shock-resisting quality of this link was actually low, but it appears that the tensile strength and elongation are not "quite satisfactory" as indicated in the foregoing quotation.

Interesting Employees in Quality of Product

For the purpose of stimulating interest among employees in the products on which they work, a number of important companies in the Central West have adopted an effective method devised by their advertising manager, G. P. Blackiston, Canton, Ohio. On the factory bulletin boards various full page advertisements are posted, generally with illustrations, all under the legend, prominently displayed: "We depend upon you to back up these advertisements." In connection with the advertisements themselves is an additional expedient for enlisting the interest of the employee who reads. Typewritten pasters affixed to the advertising page contain sentiments like the following:

A strong statement, but we feel you are able to back it up, providing you put forth your best efforts.

A small mistake on your part means useless advertising on our part.

Note what small and apparently insignificant arguments are used to-day in selling. Let nothing be too small for your attention.

We have to sell more than the mere product itself to-day. We must give service. Help us to give it.

Our product is no better than the care you exercise in its handling. Are we making the best?

A small unnoticed mistake on your part is too late to rectify when it reaches South America. Be sure no mistakes occur.

British Columbia's zinc output in 1915 was 12,982,440 lb., an increase over 1914 of 5,115, 973 lb., or 65 per cent and 322 per cent in value.

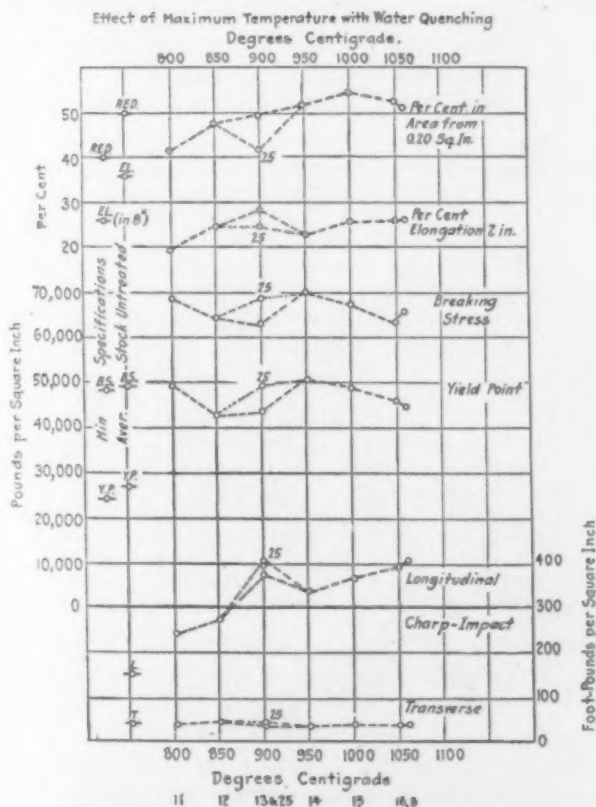


Fig. 4—Effect of Maximum Temperatures of Heating with Water Quenching. Specimens heated to from 800 to 1060 deg. C. Results of untreated material at left

going tests lead to the conclusion that the present heat treatment of cooling in air slightly decreases the yield point and tensile strength, increases the ductility, and greatly increases the resistance to shock of the metal of the forged link.

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Our Lead in Electric Steel

The position of the United States in the electric steel industry has taken on greater significance in the past year. The country has not only increased its margin in number of furnaces over its nearest competitor, but in other important respects has advanced. Our review of this important industry in THE IRON AGE, Jan. 4, 1917, credited the United States with 136 furnaces. One year ago this country stepped into first place with seventy-three. The increase is thus nearly 100 per cent in a year.

More important, however, is the advance made in production. In 1915 the output of electric steel furnaces in the United States was about 69,000 gross tons, while that of Germany, with fewer furnaces and under war conditions, was 129,000 metric tons—a notable achievement. The figures for 1916 have not been compiled. With 148,000 tons already reported for the first ten months of the year, Germany's total is likely to reach 175,000 tons. To what extent French electric furnaces in occupied territory figure in this total is not known. A conservative estimate of production in the United States is 225,000 tons for 1916—far exceeding that of any other country. The output in 1912 was only 18,309 tons.

Thus far only 59 of the 84 Heroult furnaces credited to this country and Canada are in actual operation, leaving 25 to be completed for operation in 1917, while of the other types fully 50 per cent are yet to produce steel. It should also be noted that the large 20-ton furnace of the United States Steel Corporation at Duquesne, capable of making 225 tons of steel per day, did not start until the middle of last November, and that two more of this capacity are to operate at South Chicago by the middle of 1917. It is reasonable to expect, therefore, that the country's output in 1917 will at least double that of 1916. The advance of the industry in Great Britain is also striking, and that country's production will be of increasing importance in future calculations.

In the past year plans for the largest electric steel plant in the world were authorized by the Steel Corporation for South Chicago. Its annual capacity will be about 210,000 tons. It is expected to demonstrate the practicability of operating the electric furnace on hot metal as an

adjunct to other mediums. Thus far in the United States development has been almost entirely in melting cold charges.

The greater favor of the arc furnace is emphasized in the past year's progress. There was no gain in the United States for the induction furnace, and a gain of only 12 in a total increase of 168 furnaces in the world.

Until last year the electric furnace had made its rapid advance in this country largely in the steel casting industry. But in 1916 it is both significant and gratifying that the growth has been more in the production of special and tool steels. Only 8 of the 40 new Heroult contracts in 1917 were in steel foundries. The rest are to make special and alloy tool, rail and other steels. In England the same tendency is seen, indicating that those who still pin their faith to the electric furnace as a competitor with some of the old processes may see their prophecies fully realized.

Railroad Consumption of Steel

The comprehensive statistics presented annually by the *Railway Age Gazette* relative to car and locomotive building and track laying are of particular interest at this time as they throw their share of light upon the question where our record production of steel is going.

The summaries of cars and locomotives bought do not segregate Canada from the United States, but the Canadian addition is not a large one, involving orders in 1916 for only about 10,000 cars, apparently, of which 6000 were for export. The 1916 orders were as follows:

	Locomotives	Freight Cars	Passenger Cars
Domestic	2,910	170,054	2,544
Export	2,983	35,314	109
Total	5,893	205,368	2,653

The particular question the trade is disposed to ask is what causes the steel mills to be so crowded with work and the car and locomotive shops to be unable to promise anything but long deferred deliveries. As the orders in 1914 were light and were placed chiefly in the first half of the year, 1915 must have opened with practically clear order books. Using our railroad contemporary's statistics, the course of the locomotive business seems to have been approximately as follows: Ordered in 1915, 2462; built, 2085; accumulation, 377; ordered in 1916, 4974; built, 4075; year's accumulation, 899.

The two years' accumulation would be 1276, and the orders now on books should be this number plus the few that may have been carried over from 1914. In 1907, the year of greatest activity, 7362 locomotives were built, while in 1913, the largest year since, 5332 locomotives were built.

The course of freight car building appears to have been about as follows: Ordered in 1915, 128,014; built, 74,112; accumulation, 53,902; ordered in 1916, 199,538; built, 135,001; accumulation, 64,537. Accumulation in two years, 118,439. In 1907, the year of heaviest building of freight cars, 284,188 were constructed.

The capacity of the car and locomotive shops can hardly have decreased since 1907, and on account of improvements in shop practice common to all such industries it should have increased materially, by more than the size of cars and locomotives has increased. The testimony of the statistics, therefore, is that by no means has the fabricating capacity of the car and locomotive shops been taxed by the car and locomotive purchases. If deliveries still cannot be made within a reasonable time it is because the raw materials and the appurtenances cannot be purchased for early delivery, or the shop capacity has been diverted to other uses. The outstanding feature of the year's business, our contemporary says, has been the prices paid. Those of freight and passenger cars have advanced from 75 to 80 per cent over what they were a year ago, and they are now almost three times what they were two years ago. Over one-half the freight cars were ordered since Oct. 1 when prices were at the highest.

Of the cars ordered in 1916 of which the type was specified about 54 per cent were substantially all-steel, while in addition about 27 per cent were full steel underframe. A rough estimate would be 2,500,000 gross tons of rolled steel required for the construction of all the cars and locomotives built in 1916, certainly no great tax upon the steel mills, for there is every reason to believe that in 1907 they furnished nearly double that amount when their output of steel was about 55 per cent as large as in the past year. In other words, the proportion of steel passing into rolling stock was decreased by two-thirds from 1907 to 1916. This does not answer the question, "Where is the steel going?" but it does indicate one direction in which it is not going.

It did not require the annual compilation to show that railroad building has not been resumed in the United States, but still it is of interest to note that in 1915 933 miles of new first track was constructed and in 1916 1098 miles, the two years being the smallest in this respect since 1864. The average annual increase, 1899 to 1914 inclusive, had been about 3850 miles. The additional mileage in 1916 of secondary main line track was only 345 miles. In the circumstances it is fair to presume that very little yard and siding track was added, so that the total consumption of rails by the steam roads in the laying of new track of all sorts must have been less than 250,000 tons. The normal annual consumption of rails for relaying purposes is about a million tons or a trifle more.

Making allowance for various minor lines of steel consumption by railroads it would appear that their total consumption of rolled iron and steel in 1916 was in the neighborhood of about 4,000,000

gross tons, or approximately one-eighth the country's output. A quarter century and more ago, when the railroad system of the country was being constructed, the proportion was usually estimated at about one-half.

The New Steel Capacity

New steel-making capacity, as presented in the last two annual summaries of THE IRON AGE, is as follows, in terms of gross tons of steel ingot capacity per annum:

	Corporation	Independents	Total
In 1915.....	280,000	1,125,000	1,405,000
In 1916.....	665,000	3,540,000	4,205,000
In course.....	1,430,000	3,585,000	5,015,000
Total.....	2,375,000	8,250,000	10,625,000

There was scarcely any new construction in 1914 and thus it is convenient to take as a single group the new construction completed in 1915 and 1916 together with the new construction now in progress, making a grand total, as shown above, of more than 10,000,000 tons in steel ingot capacity.

The figures are worthy of study from various angles. A subject of perennial interest is the relation between the Steel Corporation and the independents. The Corporation made 65.7 per cent. of the country's steel ingots and castings in 1901 and 50.9 per cent. in 1915. The decrease was quite steady, about one point per year. In the above summary the 1915 new construction is included, but the capacity became effective late in the year, as a rule, and did not materially affect the relations for the year. If the production in 1915 be assumed to have been 83 per cent. of the capacity existing at the beginning of the year, and the new construction as shown above is added, the eventual capacity indicated is fully 22,000,000 tons for the Corporation and 27,000,000 tons for the independents, a total of fully 49,000,000 tons, of which the Corporation's proportion would be 45 per cent. According to the former rate, its proportion would drop one point per year, so that if it stood at 66 per cent in 1901 and at 51 per cent in 1915 it should be 45 per cent in 1921. The theory has sometimes been propounded that the Steel Corporation management was disposed to let the proportion drop until it stood below 50 per cent, whereupon a disposition would develop to avoid further drops. Of the Corporation's ability to expand its steel-making capacity at a much greater rate there is of course no question.

Steel-making and steel-finishing capacity are different items. There never was, and probably never will be, a perfectly rounded out steel plant which stayed so for a twelvemonth. At all stages of the manufacturing processes there is a crowding for more output and some departments break their previous records more readily than others. Sometimes it is an apparently minor improvement that increases the output of the plant as a whole, an additional soaking pit or two, or a more powerful blooming-mill engine, for instance.

From this viewpoint it is interesting to compare the additions to steel-ingot capacity with the additional rolling units installed. No extremely precise comparison can be made, because the steel passes through successive rolling operations and to increase the rolling capacity it is not necessary that increased capacity be installed for each stage. At one plant additional slabbing capacity may be

needed, at another plant additional finishing capacity, and at another plant an additional or a larger blooming mill. A careful scrutiny of the new construction summaries published in *THE IRON AGE*, however, counting as new rolling capacity any really important addition, indicates that in 1915 about one-half the additional steel ingot capacity was accompanied by corresponding additions to rolling capacity, about one-half being not so accompanied; that in 1916 about one-third the new ingot capacity involved no increased rolling equipment, and that in the new construction program now in course only about one-sixth the new ingot capacity is unaccompanied by commensurate increases in rolling capacity.

This agrees more or less with what might have been surmised on theory. The demand for shell steel, the production of which involves heavy discards, naturally placed the burden upon the open-hearth furnace and disturbed the alignment whereby, early in the movement, there was a disposition to increase the ingot-making capacity so as to keep the blooming and other mills engaged. The new construction of 1915 and 1916 rounded out the proposition afresh whereby in the new construction now in progress nearly all the ingot-producing capacity is matched by ingot rolling and finishing capacity.

A noteworthy fact is that there has not been, nor is there now, any preponderating new construction in the plate mill department. For a twelvemonth prices for delivery at mill convenience have been higher for plates than for shapes and bars, while for a longer period there have been large premiums for plates for early delivery. Of all classes of steel demand, that for ship plates is by far the most promising as to the after-the-war period, for all authorities agree that it will require a period of several years, some say as many as ten years, for shipping to be brought up to the requirements, while the prospects are good for plate demand for car building, structural work, etc. Undoubtedly the production of plates has greatly increased, however. The orders taken by the plate mills have particularly helped toward large outputs, for the demand has run to wide plates and orders for thin plates have been refused, being left for jobbing mills. The high price that has ruled for heavy gages of blue annealed sheets as compared with 28 gage black sheets is clear evidence of the disposition of plate mills to pick out the orders conducive to large tonnages. As the slabbing mill must be heavy, from the nature of its work, it is usually able to feed the plate mill all the steel it can consume.

New construction in the blast-furnace field appears to have lagged far behind new steel works construction, but the old blast furnaces have shown themselves capable of producing much more pig iron than had been expected. From the middle of 1912 to the middle of 1913 they appeared to be operating substantially at capacity, yet they produced only 32,150,000 tons of pig iron in the period. Early in 1916, with less than 1,000,000 tons capacity added by new furnaces, a rate exceeding 39,000,000 tons was readily reached, so that apparently about 6,000,000 tons additional production was secured, by one means or another, from the old furnaces. Five blast furnaces have been completed since late in

1915 while 25 are under construction, the 30 stacks representing about 5,000,000 tons of pig-iron productive capacity. The two increases together fully match the new steel capacity, and probably represent an excess, for steel-ingot capacity does not represent pig-iron requirements, about 25 per cent of the ingot eventually finding its way back to the open-hearth furnace. At the present time the alignment is different from what it was a year or two ago, or will be a year or two hence, or pig iron would not be selling at the highest price since 1880.

Whether the prospective steel-making capacity of 49,000,000 tons represents the proper tonnage in relation to prospective demand is a question upon which a variety of opinions may be expressed. The rate could hardly be attained before the middle of 1918. One half of this, or 24,500,000 tons, was the capacity about January 1, 1908, ten and a half years earlier, while one-fourth of it, or 12,250,000 tons, was the capacity about the middle of 1900, seven and a half years earlier.

Our Half-Yearly Index

The Index of *THE IRON AGE* for the past half year, July to December inclusive, has been compiled and printed, and is now ready for distribution. It will be forwarded promptly to those who have entered their names on our list as desiring it. Others who may have use for copies will be furnished them by addressing our Circulation Department.

CORRESPONDENCE

Tungsten Ores from South America

To the Editor: Referring to my article in *THE IRON AGE* of Jan. 4, there is one statement which I fear was misleading. On page 23, first column, next to the last paragraph, the first sentence reads as follows: "In 1916 practically no [tungsten] ore was imported except from Japan, although large quantities were available in South America."

The word "available" might convey a wrong impression. Large quantities of South American ore were actually shipped here, but the sentence as written is open to the construction that while large quantities were available none was shipped to this country.

New York.

DE COURCY BROWNE.

Gross profits of the Krupp Company for the business year, 1915-16, were 95,929,000 marks, compared with 113,230,000 marks in 1914-15. Taxation, including the war tax, absorbed 28,650,000 marks, compared with 10,717,955 marks a year ago. For 1914-15 the dividend was 12 per cent. though the profits would have permitted 24 per cent., but shareholders, mainly members of the Krupp family, devoted the rest to the endowment of a fund for the relatives of soldiers killed in the war. The 1915-16 dividend is again 12 per cent., but the report states that as the increasing demands of the army involve very considerable and expensive renewal of plant and extensions to works, a dividend of only 6 per cent. will be actually distributed, the rest being taken as a loan to the company irredeemable for 10 years. Of the company's employees, 31,000 have joined the colors, an increase of 4000 over last year.

The sale of cranes has been prohibited by the British Government, except under permit from the Ministry of Munitions, according to a cablegram sent from London, Dec. 28, 1916, by U. S. Consul General Robert E. Skinner.

CHAIRMAN GARY'S VIEWS

Comment on Present Prosperity and the Outlook for Business

In a statement given out Jan. 8, Chairman E. H. Gary reviews at length various phases of the business situation and some aspects of the future. Some extracts are given below.

Great Steel Prosperity

The demand for steel, for more than a year, in all departments has been in excess of the supply; the production for 1916 was about 28 per cent greater than for any previous year; the prices have been higher for many, and probably most, of the materials sold than those received for many years, and they have generally been influenced by the purchaser himself in consequence of his eagerness to supply his requirements; collections have been entirely satisfactory, delay in payment being the exception; and, much to the pleasure and comfort of both employer and employee, the wage scale has been and is the highest ever paid. It follows that profits have been large. The unfilled orders on hand surpass any previous record. With respect to the lines in which it is customary to contract for future deliveries there are commitments sufficient to cover full capacity for 1917 and a part of 1918. This business is firm and not subject to cancellation.

The steel and iron conditions probably reflect the general business situation. There is little cause for complaint so far as the present prosperity is concerned. * * * Ours is the richest of all nations. We have the most gold. We have the largest amount in cash. We have become a creditor nation. The annual productive capacity of the United States exceeds in value all other countries. We are practically self-contained for the purpose of supplying our necessities. Circumstances beyond our control or influence have placed the United States in the position described. We do not boast of this. We deprecate and deplore the awful tragedy that has brought destruction and hindered progress to other nations.

Measures for the Future

But our business community has more concern for the future. Large numbers are of the opinion that the unprecedented prosperity of the last year has resulted from the war; that except for the war the business depression which existed between Oct. 1, 1913, and Oct. 1, 1914, would have continued or grown worse unless the causes which produced it should have been removed. The war furnished business and money from other countries; and it interrupted the practice of dumping into our markets the surplus goods and wares produced abroad with cheap labor and offered at or below even the cost to the foreign producer.

Whether satisfactory business will continue without interruption after the war closes, what rate or percentages of decreases, if any, in volume or profit will ensue, when, if at all, diminution may be expected, are mooted questions. It would not be useful for my purposes at this time to present in detail the reasons given for either view. * * * It is appropriate to refer to some of the things particularly applicable to our own welfare which bear upon the future economic position.

In the first place, our large capital resources should be kept intact, so far as consistent with the principles of safe government, wise and economic administration, proper development and progress, absolute protection to the rights of all, and the transactions of business, public and private. We should not become over-extended financially. Our cash resources ought not to be so tied up as to become unavailable for our own demands. They should be kept in liquid form to a large extent, so as to permit realization of actual money or credit upon them if and when necessary. We should be prepared for emergencies, for adverse developments, even though unexpected.

Our country should be placed and kept on a parity with all other countries. I refer to the tariff question. This question should not be considered or treated as a political or partisan one. The greatest good to the greatest number should be the sole inquiry and determination. Prohibitive tariff rates, so-called, or schedules that are so high as to permit a producer to oppress the consumer should not be permitted; but tariff rates on luxuries we do not produce in this country should be reasonably high so as to produce revenues for the Government; and tariff rates on the things coming from foreign countries similar to those we produce, whether in the forest or in the fields, in the mines or in the manufactories, should be sufficiently high to protect our producers, including the wage earners, against cheap foreign labor and its results, and so as to put our country and its people on a fair and even basis with all other countries and

peoples. Possibly this could be secured to a certain extent by anti-dumping provisions or by reciprocity conditions. At any rate, it is not reasonable or fair to our people to place them in a position of disadvantage. Nearly all foreign countries have tariff provisions in their laws which prevent our producers from selling there, and we should have like security.

And we should also, if possible, be on an equal footing with all other countries in regard to transportation facilities on the seas. When the war closes, foreigners will with greater persistency than ever reach out for the custom of non-producing countries. It is, I think, now generally conceded that the laws of navigation need amendments.

In other portions of his statement Judge Gary approved the tariff and shipping commission; deprecated class legislation; urged employers to give constant thought to the rights and welfare of employees; objected to the present income tax as tending to create classes and work discrimination, and favored a \$1,000 exemption; expressed the opinion that the foundations for optimism are solid, and concluded by saying that "the business man has many reasons to be hopeful, but there are signs of future uncertainty."

Cleveland Engineers Hear Foundry Talks

An interesting paper in which he described the improvements in foundry practice and equipment was presented by Benjamin D. Fuller, superintendent of the Cleveland foundry of the Westinghouse Electric & Mfg. Company, before the Cleveland Engineering Society, Jan. 2. He emphasized the fact that American foundries have undergone more marked changes in the past 15 years than in any previous period of the industry. Comparing the old foundry with the new, he made reference to the importance that the metallurgy of iron and chemical analysis had attained in foundry practice.

In comparing the methods of molding and of handling the sand, molds and finished castings, Mr. Fuller pointed out that the tendency in modern foundries is to utilize floor space by employing extensive conveying and distributing apparatus. Among the important improvements in the way of equipment introduced in the past few years he mentioned monorails, belt, link, and bucket conveyers, sand cutting and tempering devices and sand-blast apparatus. Reference was made to some of the modern foundry methods and equipment of the new Westinghouse continuous foundry in Cleveland. An illustrated talk on various types of molding, pouring and cleaning equipment, showing the development of this equipment, was given by H. Cole Estep, associate editor of *The Foundry*.

Advance in German Steel Refused

The London *Ironmonger* states that the German steel syndicates recently urged that they be allowed to raise their selling prices because of increased cost of production, but the authorities replied that a moderate increase would be permitted for semi-finished products only. The Berlin *Tageblatt* points out that the balance sheets of the great steel companies afford sufficient reason why they should not be allowed to advance prices still more.

Application has been made to the Maryland Public Service Commission by the Patapsco & Back Rivers Railroad Company to exercise its franchise and build a road 6.4 miles long, which will serve the plant of the Bethlehem Steel Company at Sparrows Point, Md. Frederick W. Wood, general manager of the Maryland plant of the Bethlehem Company, is president of the railroad company. In appearing before the commission, Mr. Wood said that the Bethlehem Company contemplates the construction of a large wire mill and a mill for the manufacture of tubes and pipes.

The plant of the National Steel Foundry at New Haven, Conn., recently acquired by the Penn Seaboard Corporation, and the Baldf plant of the corporation, at New Castle, Del., are completing a special order of 90,000 shell ingots, part of which has been made at the Penn plant at Chester, Pa.

Low Bid by Hadfields, Ltd., on Projectiles

High Efficiency Attained in War Time
Made This Possible—Shipyards' Bids
Far Beyond the Limit on Cruisers

WASHINGTON, D. C., Jan. 9, 1917.—The Secretary of the Navy will probably be obliged to appeal to Congress to increase the limit of cost of three of the four scout cruisers authorized by the last Naval appropriation act. The four vessels were offered to the private shipyards of the country two months ago but only a single bid within the statutory cost limit was received—that of the Seattle Construction & Dry Dock Company, to build a single cruiser for \$4,975,000, or \$25,000 within the limit. The Secretary of the Navy then announced that he would readvertise the cruisers Nos. 5, 6 and 7. This was done, but when the bids were again opened on Jan. 3 it was found that the Fore River Shipbuilding Corporation, of Quincy, Mass., was the only concern offering to take the cruisers at any price, its bids, however, being nearly a million dollars above the cost limit. The Seattle Construction & Dry Dock Company submitted a letter regretting that circumstances would not permit of taking any additional contracts for naval construction at this time. The bids of the Fore River Shipbuilding Corporation covered one or two vessels in the form of alternative proposals as follows:

Proposal A, Class 1.	
1 Vessel, 90,000 shaft hp., 40 months.....	\$5,900,000
2 Vessels, 90,000 shaft hp., 1 within 40 months and other within 42 months, each.....	5,825,000
Both vessels to be constructed at Quincy, Mass., subject to certain conditions specified by company, and modified form of contract required.	
Proposal B, Class 1.	
1 Vessel, 90,000 shaft hp., 40 months.	
2 Vessels, 90,000 shaft hp., 1 within 40 months and other within 42 months, for actual cost of material and labor plus fixed per cent.—for profit—to be agreed upon.	
Conditions specified under proposal A attach to this proposal.	

The bids submitted under proposal A range from \$825,000 to \$900,000 above the cost limit, which the Secretary of the Navy has no authority to exceed. The proposition under proposal B to construct the ships for actual cost plus a percentage for profit to be agreed upon is also outside the Secretary's discretion. The Naval appropriation act authorized the Secretary to contract for four battle cruisers on a cost-plus-profit basis but this stipulation applies only to the vessels specifically referred to and was intended to meet an extraordinary situation due to the fact that no warships of such combined size and speed have ever been built in the United States or in any other navy. Under the circumstances the Secretary of the Navy has no alternative but to reject the bids of the Fore River Shipbuilding Corporation and ask Congress to increase the limit of the appropriation.

It is also probable that the Secretary will be obliged to ask Congress to authorize a substantial increase in the cost of the ammunition ship for which \$2,350,000 was appropriated at the last session. The only bid received by the department was an informal letter from the Wm. Cramp & Son Ship & Engine Building Company stating that it will consider the question of building a vessel on a cost-plus-profit basis. The company estimated that the price on this basis would probably exceed \$3,000,000 and that the vessel could not be built in less than 30 months. Secretary Daniels states that he cannot consider this proposition and the department is preparing to appeal to Congress for a deficiency appropriation.

Heavy Deficits and the Navy Program

The effect of this action on the construction program now being incorporated in the Naval appropriation bill soon to be reported to the House will be unfortunate, to say the least. Congress is now facing the disagreeable discovery recently made by the Treasury Department that during the fiscal year beginning July 1, next, there will be a deficit of about \$370,000,

000. It has already been decided to issue Panama Canal bonds for about one-third of this sum but the remainder must be taken care of either by curtailing proposed expenditures or providing new sources of revenue or both. Naturally the pacifists in Congress have promptly seized upon the prospective deficit as an argument against large appropriations for the national defense and the advocates of a big navy are fighting desperately to secure the authorization this winter of that part of the three-year construction program recommended by Secretary Daniels in his last annual report. These recommendations are much more conservative than those of the General Board, the curtailment being defended by the Secretary on the ground that conditions in both navy and private yards are such as to preclude the construction of a larger tonnage within a reasonable time.

Bethlehem Makes 10 Per Cent. Reduction

In reply to a telegraphic appeal from Assistant Secretary of the Navy Roosevelt, the Bethlehem Steel Company has agreed to reduce by 10 per cent. the cost of all material which it can supply for the four battle cruisers the contracts for which have not yet been let, because the estimated expense of their construction on a cost-plus-profit basis exceeds by approximately \$1,000,000 each the limit fixed by Congress. The Bethlehem Company agrees to supply all the iron and steel entering into the four battle cruisers at the reduced rate without regard to whether one or more of the vessels are built by its subsidiaries or by other shipbuilders or in Government navy yards. It is estimated that the total cost of the materials entering into a battle cruiser is about \$10,000,000; therefore the Bethlehem Company points out to the department that if the manufacturers of other materials entering into the construction of the cruisers will also cut their price 10 per cent., the desired saving of \$1,000,000 on each vessel can be effected and the ships built within the statutory cost limit.

In his appeal for a reduction in the cost of shipbuilding materials, which it is understood Mr. Roosevelt has also sent to other manufacturers, it was stated that unless the desired concession could be obtained it might be necessary for Congress to repeal the provision of law authorizing the construction of these vessels which, because of their great size and speed, are more or less experimental.

Hadfields Under-Bid American Projectile Makers

Those persons who are so insistently declaring that American manufacturers have nothing to fear from their competitors in war-torn Europe after the great conflict is over will find food for thought in the schedule of bids submitted to the Secretary of the Navy on Jan. 3 for approximately \$9,000,000 worth of 14-in. and 16-in. projectiles for naval rifles intended to be mounted on the new dreadnaughts. In competition with four of the largest manufacturers in this country, Hadfields, Ltd., a well known English concern, underbid all rivals by an average of more than \$200 per projectile and agreed to begin deliveries in one-half the time required by the American manufacturers. The Hadfields bid is f.o.b. the works at Sheffield, England, but as the Government can arrange for transportation by colliers the freight would not be an important item.

The proposals opened on Jan. 3, which cover 7200 16-in. armor piercing, 8100 14-in. armor piercing and 900 14-in. class B (non-armor piercing) projectiles, were as follows:

Sixteen-inch A.P. Shells.—Bethlehem Steel Company, 4000 at \$775 each, first delivery in 22 months and one lot each two months thereafter; Crucible Steel Company of America,

1700 at \$768.50 each, deliveries to begin in 760 days and continue at the rate of 500 every 105 days; Midvale Steel Company, 1000 at \$900 each, deliveries to begin in 600 days and to continue at rate of 500 every four months thereafter; Washington Steel & Ordnance Company, 2500 at \$750 each, deliveries to begin in 20 months and to continue at rate of 165 per month; Hadfields, Ltd., 3000 at \$513 each, deliveries to commence in 11 months and continue at rate of 500 per month.

Fourteen-inch A.P. Shells.—Crucible Steel Company of America, 2000 at \$543.50 each, deliveries to begin in 1076 days and continue at rate of 500 every 60 days; Midvale Steel Co., 5000 at \$550 each, deliveries to begin in 450 days and continue at rate of 500 each six weeks thereafter; Washington Steel & Ordnance Company, 1000 at \$500 each, deliveries to begin in 20 months and to continue at rate of 250 per month; Hadfields, Ltd., 4500 at \$356 each, deliveries to begin in 11 months and continue at rate of 500 per month.

Fourteen-inch Class B (non-armor piercing) Shells.—Bethlehem Steel Company, 900 at \$310 each, all to be delivered within 22 months.

This is not the first time Hadfields, Ltd., has bid on American naval projectiles. In September, 1912, it bid \$187 each for 3500 12-in. and \$395 for 2000 14-in., against lowest bids from American makers of \$272 and \$490 respectively, but was only awarded a contract for 500 12-in. Hadfields, Ltd., then expected to domesticate its system of manufacture in this country. In 1914 this concern submitted bids on 14-in. shells but the Navy Department subsequently accepted a bid of \$315 from an American manufacturer. Soon after the price of these shells rose to \$415. In October, 1916, the department placed orders for 14-in. armor piercing projectiles at \$482; hence all the bids submitted Jan. 3, except that of Hadfields, Ltd., show a considerable advance over the last figures accepted by the department.

Hadfields' High Efficiency

H. A. Gillis, who represents Hadfields, Ltd., in this country, made this statement in an interview last week relative to the low bid of his company:

The bureau of ordnance of the Navy requires that these shells be tested by being fired at steel plate which is at an angle of 10 deg. when the projectile strikes. This of course robs the shell of part of its striking force. In some instances half the shells fail to meet the Government's requirements on this account. And the Government must realize that this may result in increasing the price.

We contend that we are able to provide armor-piercing shells which will meet this test, and we do not anticipate any of the trouble or additional expense to which American firms have been put. We have provided almost every nation with projectiles, and our present efficiency is such as to insure the best results and the least cost.

Since the war Hadfields, Ltd., has reached a state of efficiency previously supposed unattainable. Not only is every ship in the British navy fully supplied, but we have provided an immense surplus stock, which now reposes in storehouses and is far in excess of any demand that could be made upon it by the war. To keep our organization busy we have obtained permission from the British Government to bid for the American Government contract, and we are ready to put up bond to guarantee that we will meet the specifications in the time given and at the prices stated.

Secretary Daniels has announced that he will ask Congress for a large appropriation for a Government projectile factory, the plans for which are now being worked out by the Armor Factory Board. The secretary says: "The American manufacturers appear to be too busy making projectiles for foreign nations to be interested in the needs of the United States Navy." The secretary says he thinks a projectile plant could be constructed in time to supply all warships heretofore authorized but not yet built.

Navy Department Asks \$12,000,000 More

The Secretary of the Navy on Jan. 8 transmitted to Chairman Padgett of the House Naval Committee a request for an additional appropriation of \$12,000,000 to equip Government navy yards for the construction of war vessels, especially capital ships. In making this request Secretary Daniels says that, in spite of the best efforts of the department, the private shipbuilders of

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the country are "unable or unwilling to undertake the complete program with any assurance of speed in completion even at prices which the department regards as unreasonably high." It is intimated that up to the present time the department has not been able to negotiate a satisfactory basis for the construction of the four battle cruisers on a cost-plus-profit plan, although it is understood that all hope of reaching an agreement has not been abandoned.

W. L. C.

Peak of Iron and Steel Exports Passed

November Figures Show Declines in Total Values of Iron and Steel Exports, Tonnage Commodities and Machinery

WASHINGTON, D. C., Jan. 9, 1917.—Although the total exports of merchandise of all kinds in November broke all records by a sufficient margin, a marked reaction was recorded in iron and steel products. The decline affected the total values of this class of exports, the quantities of tonnage commodities and the values of both machinery and machine tools. The statistics for November, following upon the diminishing totals recorded in October, are likely to be accepted as evidence that the peak of the phenomenal export movement in iron and steel has been passed, but attention should be called to the remarkable fluctuations in these shipments the past year and to the fact that throughout the past 90 days exporters in all lines have been embarrassed by railroad embargoes and difficulties in obtaining cargo space, while submarine activities have still further complicated the transportation problem.

per cent over the corresponding period of 1915, while shipments of machinery gained 67 per cent over the 1915 total.

The value of all shipments of iron and steel products in November, 1916, was \$77,570,840, as compared with \$48,056,220 for the same month of 1915 and \$15,689,401 for November, 1914. Maximum exports were recorded in September of this year aggregating \$90,895,592. For the 11 months of 1916 the total was \$777,623,250, as compared with \$342,878,443 for the same period of 1915 and \$184,922,071 for the 11 months of 1914.

Exports of Machinery

Exports of machinery in November were valued at \$18,999,400 as compared with \$15,838,119 for the same month of 1915. August, 1916, still leads in the exports of machinery, with a total of \$24,657,597. Ship-

Exports of Machinery

	November		Eleven Months	
	1915	1916	1915	1916
Adding machines	\$31,837	\$94,335	\$495,496	\$1,264,717
Air-compressing machinery	37,132	66,471	444,277	773,254
Brewers' machinery	3,500	659	59,040	13,526
Cash registers	81,925	116,839	1,191,990	1,493,979
Parts of	11,388	8,373	95,529	130,205
Cotton gins	812	4,036	50,738	86,582
Cream separators	13,322	19,833	266,623	402,525
Elevators and elevator machinery	243,862	168,535	995,340	1,651,210
Electric locomotives	7,600	16,318	206,870	534,176
Gas engines, stationary	20,011	36,922	440,474	355,963
Gasoline engines	913,508	1,195,930	6,004,481	13,265,138
Steam engines	2,391,012	1,313,259	9,923,587	10,355,505
All other engines	77,172	208,010	949,994	4,546,953
Parts of	560,644	1,795,828	4,304,704	11,449,883
Laundry machinery, power	21,694	18,644	277,130	273,172
All other	18,817	25,624	234,293	253,397
Lawn mowers	8,556	10,165	267,599	206,087
Metal-working machinery (including metal-working tools)	4,644,713	4,681,652	38,831,991	73,192,656
Meters, gas and water	13,288	22,487	225,715	328,741
Milling machinery (flour and grist)	138,904	72,352	2,082,617	1,976,639
Mining machinery, oil well	40,855	159,352	1,158,096	1,815,191
All other	906,066	756,885	5,236,771	6,598,910
Paper-mill machinery	63,769	137,968	811,460	1,031,139
Printing presses	135,022	133,775	1,310,474	1,753,218
Pumps and pumping machinery	439,003	590,052	3,099,880	5,146,966
Refrigerating and ice-making machinery	37,474	37,837	736,321	620,343
Sewing machines	350,332	430,624	5,252,926	5,027,761
Shoe machinery	120,782	67,557	1,354,619	957,076
Sugar-mill machinery	1,027,195	1,849,735	4,404,761	7,645,301
Textile machinery	195,552	356,830	1,700,644	3,212,311
Typesetting machines	24,820	74,525	416,277	1,034,000
Typewriting machines	738,007	908,529	6,523,380	9,941,544
Windmills	53,497	81,656	787,889	937,497
Wood-working machinery, saw mill	32,679	63,712	314,415	416,740
All other	52,953	85,236	957,157	829,878
All other machinery and parts of	2,382,416	3,348,855	21,445,253	35,712,135
Total	\$15,838,119	\$18,999,400	\$122,858,811	\$205,234,317

The fact should also be borne in mind that November included but 25 working days.

Comparison of Export Figures

The total exports of iron and steel products in November showed a gain as to values of 61.4 per cent over November, 1915, but a decline of 14.6 per cent as compared with the high record of September of this year. Tonnage commodities gained 53 per cent over November, 1915, but lost 14 per cent as compared with the high figures of September. Shipments of machinery in November gained 20 per cent over the corresponding month of 1915, but lost 23.5 per cent as compared with the record total of August of this year. The significance of the decline in machinery exports, indicating that the munition factories of Europe have practically completed their equipment, has been heretofore remarked upon. Shipments of machine tools gained only a fraction of 1 per cent over November, 1915, and lost 53 per cent as compared with the high-water mark reached last May.

For the 11 months ended November the total exports of iron and steel surpassed the high record of 1915 by 128 per cent. Tonnage commodities rose 74

ments of metal-working machinery in November aggregated \$4,681,652, as compared with \$4,644,713 for the same month of 1915. The record in exports of metal-working machinery was made in May, 1916, when the total was \$9,935,806. Exports of machinery of all kinds for the 11 months ended November, 1916, were valued at \$205,234,317, as compared with \$122,858,811 for the corresponding period of 1915, which was the record total for the 11 months' period. Details of the exports of machinery for 1915 and 1916 and for the two 11 months' periods are given in the accompanying table.

Exports of Iron and Steel

The exports of iron and steel for which quantities are given aggregated 554,858 gross tons in November, 1916, as compared with 362,765 tons in the same month of 1915. Maximum exports of tonnage commodities were recorded in September of this year, when the total was 643,763 tons. For the 11 months of 1916 shipments aggregated 5,523,143 gross tons as compared with 3,159,346 tons for the same period of 1915. An accompanying table shows the exports for November and for the 11 months ended November, 1916, as compared with 1915.

Reports from the leading ports of entry received by the Bureau of Foreign and Domestic Commerce indicate that the export movement in December encountered the same embarrassments that obstructed it in November. While the calendar year will ex-

Exports of Iron and Steel

	November		11 Months	
	1915 Gross tons	1916 Gross tons	1915 Gross tons	1916 Gross tons
Pig iron.....	24,551	102,786	202,692	507,046
Scrap.....	4,987	19,559	63,085	197,905
Bar iron.....	5,766	4,039	35,752	67,744
Wire rods.....	16,359	12,452	151,554	144,756
Steel bars.....	38,783	57,822	353,970	710,708
Billets, ingots and blooms, n. e. s.....	59,510	125,038	510,816	1,345,826
Bolts and nuts.....	2,701	2,159	20,984	26,994
Hoops and bands.....	3,968	3,548	26,320	40,963
Horseshoes.....	750	409	15,318	7,674
Cut nails.....	456	326	3,968	4,539
Railroad spikes.....	3,434	1,289	10,670	22,461
Wire nails.....	8,375	11,247	83,144	139,159
All other nails, including tacks.....	966	1,768	8,166	11,090
Cast-iron pipe and fittings.....	3,034	5,463	42,185	64,458
Wrought pipes and fittings.....	10,909	19,337	111,594	144,192
Radiators and cast-iron house heating boilers.....	106	121	1,951	2,226
Steel rails.....	58,283	55,022	350,660	499,224
Galvanized iron sheets and plates.....	4,138	6,900	71,989	76,567
All other iron sheets and plates.....	3,618	3,964	22,964	42,586
Steel plates.....	18,542	27,092	204,566	249,985
Steel sheets.....	5,658	7,426	90,091	95,528
Structural iron and steel.....	24,774	28,790	214,017	266,001
Tin and terne plates.....	15,538	15,817	137,589	209,119
Barb wire.....	29,638	23,529	222,444	403,063
All other wire.....	17,921	18,955	202,857	249,033
Total.....	362,765	554,858	3,159,346	5,523,143

ceed all previous export records by a wide margin, it is doubtful if December will surpass the high figures for September.

Imports of Iron and Steel

The imports of tonnage iron and steel in November made a substantial gain owing to increased importations of scrap iron and steel, the aggregate being 42,543 gross tons, as compared with 37,130 tons for November, 1915. Scrap constituted nearly 60 per cent of the total in November of this year. The imports for the 11 months of 1916 were 275,734 gross tons, as com-

Imports of Iron and Steel

	November		11 Months	
	1915 Gross tons	1916 Gross tons	1915 Gross tons	1916 Gross tons
Ferromanganese.....	115	6,232	4,895	73,435
Ferrosilicon.....	715	761	6,447	6,447
All other pig iron.....	8,231	7,555	73,321	47,291
Scrap.....	18,881	25,095	59,316	84,615
Bar iron.....	1,001	459	8,236	7,424
Structural iron and steel.....	172	89	1,430	1,212
Steel billets without alloys.....	3,141	242	4,397	9,013
All other steel billets.....	759	1,094	9,721	14,576
Steel rails.....	3,305	846	77,245	25,777
Sheets and plates.....	268	111	1,308	1,491
Tin and terne plates.....	54	38	2,280	975
Wire rods.....	567	11	4,845	3,478
Total.....	37,130	42,543	246,994	275,734

pared with 246,994 tons in 1915. The foregoing table shows the imports of tonnage commodities for November, 1916, and for the 11 months ended November, as compared with 1915.

W. L. C.

Russian Manganese Ore Shipments

Shipments of Russian manganese ore from the ports of Poti and Batum in the fiscal year 1916 were 9769 net tons of Tchiaturusk ore against 9750 tons in 1915 and 788,214 tons in 1914. By the Tchiaturusk side line there was forwarded from the Tchiaturusk district 131,934 tons in the 1916 period, of which 60,742 tons was further forwarded by land. In the fiscal year 1915 shipments from this district were 35,246 tons, and in 1914 they were 787,661 tons. These data are given by the statistical bureau of the Council of Congresses of Miners of Manganese Ore. The price of the ore, which in the first three months of 1916 did not exceed 8 to 9½ kopecks (about 4 to 5c.) (100 kopecks = 1 ruble = 51.5c.) per pood, has risen to 20 to 22 kopecks (about 10 to 11.25c.) per pood (1 pood = 36.11 lb.). This would be an advance from \$2.50 to \$3 per gross ton to \$6.20 to \$6.80.

BRITISH STEEL EXPORTS

November Shipments Lowest of 1916—Imports Falling—Valuations Higher

British iron and steel exports in November, 1916, mostly supplies sent to the Allies, were 224,554 gross tons, excluding iron ore and including scrap. This is the smallest month in 1916. Exports have constantly diminished recently, owing to Government prohibitions, those for October having been 241,261 tons and for September 231,335 tons. In November, 1915, the export total was 308,319 tons. The total exports for the first 11 months of 1916 were 3,199,220 tons, or 290,838 tons per month, as against 2,988,517 tons for the 11 months of 1915, or 271,683 tons per month.

Pig-iron exports for November, 1916, were 43,071 tons against 77,958 tons for November, 1915. To Dec. 1, 1916, these shipments were 749,715 tons as compared with 446,363 tons to Dec. 1, 1915. Of this year's total France has taken 518,228 tons and Italy 121,952 tons.

Exports of ferromanganese in November, 1916, were about 6900 tons against about 8000 tons in November, 1915. The total for the first 11 months of 1916 is given as 119,139 tons exceeding those for the same 11 months in 1915 by about 29,000 tons.

Steel-bar exports in November, 1916, were 60,248 tons (53,962 tons going to France) against 58,121 tons in November, 1915. To Dec. 1, 1916, the total was 596,297 tons against 453,426 tons to Dec. 1, 1915. France had taken 503,795 tons of the former total. The total rail exports to Dec. 1, 1916, were only 47,958 tons against 232,352 tons for the same period in 1915.

The movement in galvanized sheets is constantly decreasing, having been only 2048 tons in November. The totals for the 11 months to Dec. 1, 1916, and 1915, were respectively 115,755 tons and 273,946 tons. Tin-plate exports continued at about the same rate as in 1915, the total to Dec. 1, 1916, having been 307,462 tons as contrasted with 337,961 tons to Dec. 1, 1915. Of the former total France took the largest amount, 62,369 tons.

November imports of iron and steel, excluding iron ore and including scrap, were 58,773 gross tons. For the first 11 months of 1916 the imports were 827,771 tons valued at over £10,847,000 as against 1,194,353 tons to Dec. 1, 1915, valued at over £10,203,000.

Blooms, billets and slabs imported in November, 1916, were 9865 tons comparing with 19,020 tons in November, 1915. Imports for the first 11 months last year fell considerably short of those for the same period in 1915, having been only 140,072 tons to Dec. 1, 1916, as compared with 405,898 tons to Dec. 1, 1915. In the former case the United States is credited with having sent 115,046 tons and with 329,606 tons in the latter case. Steel ingot imports continue large, having been 14,980 tons last November, with the total to Dec. 1, 1916, at 147,628 tons as against 183,045 tons to Dec. 1, 1915.

Iron-ore imports continue large, those for November, 1916, having been 516,651 tons against 501,144 tons in November, 1915, and 507,023 tons last October. To Dec. 1, 1916, the total imports are given as 6,505,183 tons; to Dec. 1, 1915, they were 5,609,914 tons.

The valuation of the steel exports for the first eleven months of last year is placed at £53,835,800 against £37,077,636 for the same eleven months of 1915, but the former figure represents considerably less than the latter in weight.

The Fuller Engineering Company, Allentown, Pa., has the contract for pulverized coal equipment for the American Steel & Wire Company's works at Donora, Pa., in connection with eight 60-ton open-hearth furnaces, also for pulverized coal equipment for heating furnaces of the American works of the same company at Cleveland. It has further closed a contract for pulverized coal equipment for two open-hearth furnaces in the No. 1 Lehigh plant of the Bethlehem Steel Company, South Bethlehem, Pa. The installation has been completed of a powdered coal plant to serve Atchison, Topeka & Santa Fe locomotives at Marceline, Mo.

WEBB BILL HEARING

Senators Believe Export Co-operation Legal— Friends of the Measure Should Act

WASHINGTON, D. C., Jan. 9, 1917.—Complications in the situation with respect to the passage at this session of the Webb bill legalizing combinations of American manufacturers and exporters for the development of foreign trade have increased rather than diminished as the result of an extended hearing on the measure before the Senate Committee on Interstate Commerce on Jan. 5. It has been made clear, in the first place, that the bill as passed by the House contains provisions objectionable to practically all the interests advocating this legislation and that if the measure is favorably reported to the Senate and passed by that body it must be returned to the House to run again the gauntlet of the House Judiciary Committee and to be whipped into final form by a conference committee representing the two houses. With only seven weeks of the session remaining, and with the dockets of both House and Senate crowded with important legislation as never before, the outlook for the enactment of the Webb bill during the present Congress is far from encouraging.

The hearings last week developed the fact that several members of the Senate committee are in doubt as to the necessity for legislation exempting foreign trade from the operation of the Sherman law. This feeling was frankly expressed by Senators Brandegee of Connecticut, Cummins of Iowa and Pomerene of Ohio. Senator Brandegee, in fact, went so far as to state that in the form in which the Webb bill was passed by the House it actually placed shackles on the export trade rather than relieving it from the drastic provisions of the anti-trust laws. The committee is also finding difficulty in reconciling the various suggested amendments, and is therefore disposed to regard the criticism of the various witnesses as destructive rather than constructive.

It is but fair to say, however, that the members of the Senate committee who were present at the hearing were impressed with the earnestness of the witnesses who addressed them, and especially with the arguments tending to show that, whatever the courts of last resort might hold with respect to the application of the anti-trust laws to foreign trade, the business men of the United States are unwilling to embark capital in the development of this enterprise until the law is clarified and that the banking interests in particular will not, in the present status of the question, finance operations upon the scale necessary to insure success.

Points Urged at the Hearing

John M. Redpath, of the Chamber of Commerce of the United States, described at the hearing the methods pursued by that organization in taking the referendum which recently resulted in an overwhelming vote of the business men of the country in favor of the Webb bill. Discussing the measure in detail, however, Mr. Redpath pointed out several technical defects which he urged the committee to correct.

A. C. Pearson, of the Associated Business Papers, told the committee that the trade press of the country and the industries they represented were unanimously in favor of the Webb bill and desirous of seeing it enacted at the earliest possible moment.

Robert H. Patchin, speaking for the National Foreign Trade Council, said in part:

Our recommendation for early action is based upon the fact that, even before the war, doubt as to the application of the anti-trust laws compelled American exporters individually to cope with government-encouraged combinations of foreign rivals united to resist American competition and often to sell to combination of foreign buyers equipped to depress the prices of American goods. Co-operation in export selling with every safeguard against illegal restraint of domestic trade is imperative to meet proposed post-bellum co-operative buying not only by groups of European industries but even by governments with the object of controlling prices.

The National Foreign Trade Council is desirous of strongly urging the elimination of the amendments inserted by the House. The one providing that any association formed under

this bill should not be encouraged "in trading or marketing" in our opinion absolutely nullifies the bill; and the further qualification that associations formed under this act must not restrain the foreign trade of the United States nullifies its purpose. We understand that such associations would technically be in restraint of foreign trade but, because that restraint is in the public interest, it is proposed here to legalize it with every safeguard against its employment in domestic trade.

Edward N. Hurley, who has just resigned from the Federal Trade Commission, made a strong plea for early action on the bill, which he said, in the form in which it was introduced in the House, had the unqualified indorsement of the Federal Trade Commission. Lawyers, he said, might split hairs with regard to the question whether the Sherman law really prohibited combinations in the foreign trade; the salient fact, however, is that manufacturers and shippers cannot secure proper financing for export business until the question of the legality of these proposed combinations is cleared up by Congress. Mr. Hurley also recommended the rejection of the amendments added to the bill by the House.

H. C. Lewis, manager of the National Paper & Type Company, New York, speaking on behalf of that company and also as a representative of the National Foreign Trade Council, indorsed Mr. Patchin's statement and urged the committee to act promptly.

W. P. Barba, representing the American Manufacturers' Export Association of Philadelphia, strongly favored the bill but suggested that its language should be clarified.

The members of the Senate committee sought particularly to get specific cases of just what would be attempted if the Webb bill became a law. One very clear answer was given. A representative of the smaller cement manufacturers located near the Atlantic seaboard explained that an association was about being formed for the purpose of developing the export trade of these mills. Nine mills had signed the articles of incorporation, but two others held out, not daring to enter till some permissive legislation is enacted.

It will help if manufacturers or associations who expect to take advantage of the provisions of the Webb bill will write to the chairman of the Interstate Commerce Committee, Senator Newlands, and explain in detail just what they propose to do if this bill becomes a law. This should be done with great promptness.

W. L. C.

Midvale Steel Company's First Year

The Midvale Steel & Ordnance Company reports the following income account for the year ended Dec. 31, 1916:

Gross earnings	\$38,061,276
Subsidiary company charges	549,797
Balance	\$37,511,479
Depreciation	3,525,579
Bond interest	1,816,736
Surplus after charges	\$32,169,164

The income account, by quarters, compares as follows:

	1st Quar.	2d Quar.	3d Quar.	4th Quar.
Gross earnings...	\$6,468,103	\$8,548,393	\$9,636,521	\$13,408,259
Subsidiary company charges...	104,336	150,325	120,853	174,283
Balance	\$6,363,767	\$8,398,068	\$9,515,668	\$13,233,976

The report shows the company to be in a decidedly strong position financially. It is stated that if earnings in 1917 should be as large as they were in 1916 the surplus at the end of the year will be almost equal to the price paid for the Cambria Steel Company.

The Penn-Seaboard Steel Corporation has removed its main offices from 132 South Fifteenth Street to the Franklin National Bank Building, Philadelphia. Frank Briner, who has been superintendent of operation, has been made manager of the Penn plant in Chester, Pa., succeeding Newlin Booth, who becomes assistant to Henry J. Klaer, the general manager; R. S. Munson, formerly connected with the American Steel Foundries, takes charge of the Baldt plant at New Castle, Del., succeeding Edgar J. Birtwell, who goes to the sales department.

Canadian Industrial Notes

The Department of Mines, Canada, has received from producers a record of the production of pig iron and of steel ingots and of castings in the first 11 months of 1916, which, together with estimates for December, show a probable production of pig iron in Canada in the year ended Dec. 31, 1916, of 1,171,727 net tons and a probable production of steel ingots and direct steel castings of 1,454,124 net tons, of which 1,423,485 tons were steel ingots, and 30,639 tons direct castings. The production of pig iron in 1916 increased about 28 per cent. of steel ingots and castings over 42 per cent. above that of 1915. The 1916 production was greater than that of any previous year. The second largest production of pig iron was 1,128,967 net tons in 1913. Of the total production of steel ingots and castings in 1916, about 43,790 net tons were made in electric furnaces, against 61 net tons in 1915.

An official statement of the Dominion Iron & Steel Company, Sydney, N. S., gives the output for the calendar year 1916. Steel ingots ran about 8 per cent. higher than in 1915, while the pig-iron production increased more than 12 per cent. The coal output was lower, at about 4,500,000 tons against 5,000,000 in 1915, recruiting and the shortage of shipping facilities entering as adverse factors. The approximate output is given as follows:

	1916, Tons	1915, Tons	1914, Tons
Pig iron	348,000	309,800	334,101
Steel ingots	376,000	349,000	331,349
Rolls	17,459	57,500	176,505
Wire rods	112,400	73,500	30,778
Wire products	47,500	34,000	32,414
Blooms, billets, etc.	150,000
Merchant bars	9,950

Large expenditures were made during the year for improvements and extensions to plant as well as for renewals.

Mayor Church of Toronto, on his return from Ottawa, announced that it is the intention of the Imperial Munitions Board to erect a steel plant in Toronto at a cost of \$1,000,000.

The Aetna Iron & Steel Company, Ltd., Victoria, B. C., has been formed with a capital stock of \$250,000. It will erect a plant for the manufacture of angles and other small shapes; merchant bars will be turned out later. Structural steel shapes will also be made as soon as facilities can be installed. The output of the plant at the start will be 40 tons a day. Joshua Kingham, David Milne and George H. Robertson are among the organizers of the company.

The Russian Government has placed orders with the Canadian Locomotive Works, Kingston, Ont., for 50 locomotives. This makes a total of 80 locomotives to be manufactured in the Kingston plant for Russia.

J. D. McArthur, railroad builder, Edmonton, Alberta, announces that tenders will soon be called for the construction of a steel bridge over the Peace River, immediately north of the town of Peace River, to cost \$1,000,000.

Canada's Large Munition Contracts

According to the *Monetary Times*, Toronto, war orders placed in Canada since the war began amount to \$1,095,000,000. Munitions orders, as shown in figures of the Imperial Munitions Board issued in October, made up \$550,000,000 of this total. Of the munitions total \$185,000,000 was placed in the first nine months of 1916 and an official estimate of \$50,000,000 was made for the last quarter of the year. In 1915 the total value of war orders placed in Canada, including munitions, was estimated at \$600,000,000, an amount later confirmed by Sir George Foster, Minister of Trade and Commerce, in an address at Toronto. The orders for shells and fixed ammunition in that year were approximately \$365,000,000, leaving \$235,000,000 to represent general orders.

The Union Steel Casting Company, Gerad Street, Roxbury, Mass., has added to its foundry a fireproof building, 100 x 320 ft., in which will be placed two 10-ton open-hearth furnaces.

CHAIRMAN HURLEY RESIGNS

His Withdrawal a Distinct Loss to the Federal Trade Commission

WASHINGTON, D. C., Jan. 9, 1917.—The resignation of Chairman Edward N. Hurley of the Federal Trade Commission has been followed by the publication of many more or less accurate statements concerning the reasons therefor. While Mr. Hurley diplomatically states that he has been impelled to resign in order that he might be free to give his undivided attention to his private business, it is a well-known fact that there has been much friction in the commission for many months and that for some time Mr. Hurley has found his duties far from congenial. Some of the friction resulted from the action of the commission last year when Chairman Davies was demoted and Mr. Hurley was elected in his stead.

The refusal of the Senate to confirm Commissioner Rublee deprived the commission of its fifth member, and the body has since been reported as deadlocked on numerous questions. The investigations of the print paper industry and the production and marketing of gasoline have dragged along in exasperating fashion. The gasoline report is said to have been rewritten once or twice in the hope that a majority of the commission would sign it, but thus far without success. Mr. Hurley is reported as taking the view that unless the scope of the act creating the commission is widened it will never accomplish substantial results, and this view is said to be one of the reasons for his resignation. Mr. Hurley has been outspoken in discussing many important questions of the day, and at times his opinions have clashed with those of high Government officials. Notably, he has been in disagreement with Secretary Redfield concerning the position of American manufacturers after the European war, Mr. Hurley taking the view that Europe has developed extraordinary efficiency as the result of stern necessity and that American manufacturers will have to meet sharp competition as soon as peace is restored.

Mr. Hurley's resignation is a great loss to the commission, as he is regarded not only as its ablest member but the only one with any comprehensive business experience. Mr. Davies is rated as a fair administrative officer but without much knowledge of commercial affairs; Mr. Harris has devoted much time to Georgia politics, for which he has been censured on the floor of the Senate in open session, while Mr. Parry's experience in business has been restricted almost entirely to the publication of a newspaper. It is rumored that Representative Davis of Minnesota will be appointed to succeed Mr. Hurley and that the President will make another effort to secure Mr. Rublee's confirmation by again sending his name to the Senate. W. L. C.

German Steel Output a New Record

A new high record for the war was made in the German steel output for October, 1916. The total was 1,423,535 metric tons against 1,393,186 tons in September. The previous high record was 1,414,097 tons in August. The daily rate of production in October was 54,751 tons per day and in June 54,990 tons per day. The October output was made up of 684,003 tons of Bessemer ingots, 597,535 tons of open-hearth ingots, 117,871 tons of steel castings, 9947 tons of crucible steel and 14,279 tons of electric steel. The production of steel castings establishes a new record. The steel output in October, 1915, was 1,215,287 tons and in October, 1914, it was 900,201 tons. The output for 10 months to Nov. 1, 1916, was 13,354,418 tons against 10,892,378 tons to Nov. 1, 1915. The October rate is reported to have been 90 per cent. of that in the last months of peace.

India's production of manganese ore in 1915 was valued at \$4,523,636, against \$4,269,205 in 1914, an increase of 5.9 per cent. In tungsten ore the increase in 1915 was 66.2 per cent. over 1914, the respective total values being \$1,444,241 in 1915 and \$868,880 in 1914.

Iron and Steel Markets

FOREIGN DEMAND HEAVY

Railroad, Shipyard and War Buying

Continuance of Full Mill Operations Indicated— Price Situation Strong

A great alertness is evident for signs of transition to a different condition in iron and steel. Consumers of finished steel, apart from plates and rails, hold off, finding little in recent events to help them decide about purchases for the second half, and such deliveries are as a rule the earliest large producers can give them.

Reports of cancellations of British shell contracts in this country and their transfer to Canada are misleading. Canadian works all along have been given all of this business they could handle. Little new steel capacity has been provided there, though the Ministry of Munitions is making every effort to increase output. While more American machinery has been bought to increase Canadian munitions output, the need for steel from this side is practically the same.

The failure of the Allies to exercise some options with munitions works in this country for the second half of this year does not change the steel works situation. It is known that one or two steel companies have been urged to take on more shell steel for delivery after July 1. In the Chicago district 20,000 tons of rounds have just been placed for France.

Some steel producers are making more effort than others to get business and such activity has been given a significance in some quarters quite at variance with the rigid holding of high-level prices and the tightness of mill deliveries.

The Steel Corporation's increase in unfilled orders was 488,744 tons in December, indicating both the cutting down of production and the limiting of mill shipments on the one hand, and on the other a considerably larger proportionate booking of new business than was true of independent companies. The showing argues strongly for the continued maintenance of heavy mill operations.

Operating conditions are loosening in the Pittsburgh and Valley districts. The Steel Corporation started five of its banked blast furnaces last week and eleven in the week preceding. But the problem of coke supply and prices in the next three months is still formidable. Blast furnace companies that refused to pay \$4 two months ago for 1917 coke are now contracting at \$7, and \$6 appears to be minimum on first half contracts.

Foreign buyers who have looked for some relaxing of prices under peace talk have been disappointed. Increasing difficulties with ocean freights and the asking of as high as \$55 a ton to French and Italian ports have not changed the attitude of the mills. Yet it was demonstrated one year ago that freights can go high enough to cut down even what is called imperative buying.

Foreign and domestic buyers are in close competition for the plate output. At Pittsburgh 15,000 tons of plates were sold for export in the second

half at 4c. at mill. At Chicago a 2500-ton order from the Orient for early shipment brought close to 6.50c. Chicago. Pittsburgh mills have before them a 60,000-ton inquiry for delivery to a Western shipyard through the entire year. Plate prices, at least, are still decidedly on the up grade.

Railroad buying, like that for shipyards, shows export business competing with domestic for mill space. Spain is in the market for 35,000 tons of rails, Denmark for 10,000 tons and the Dutch East Indies for 5000 tons. Deliveries in 1918 would be taken on most of this. At home 30,000 tons of rails were bought in the past week and one inquiry for 40,000 tons is pending at Chicago.

The Southern Pacific has closed for 94,000 kegs of spikes—the largest order on record and at the highest contract price—also for 19,000 kegs of bolts.

While high prices check general building projects, industrial expansion goes on regardless of peace talk. Bids have been asked on 7700 tons for the Westinghouse Electric plant at Essington, and 1500 tons has been let for part of the new Worth steel plant on the Delaware River, with 5000 tons yet to be bought. Besides 15,600 tons of New York Subway work, on which bids have just gone in, 20,000 tons will come up next month for Philadelphia subways.

In pig-iron prices the tendency is upward and some fresh demand has developed after a lull. Foreign buying from indications will still be large. For France and Italy lots of 7500, 6000 and 5000 tons of Bessemer have been bought in the week, mostly at \$35 at Ohio furnace.

The market for basic iron is strong at \$30 in the Valley. An 8000-ton export order has been taken at that figure and inquiry for 20,000 tons is before the Pittsburgh market. In foundry iron there has been a renewal of buying on a moderate scale for the second half of the year.

Pittsburgh

PITTSBURGH, PA., Jan. 9, 1917.

Consumers are giving more thought to the chance of an early end of the European war. Once active peace negotiations start, it is believed a quick readjustment in prices to a much lower basis would result. As it is now, consumers cannot place orders for hardly any kind of finished steel, and get promise of deliveries before the second half of this year. Hence they are showing more hesitation in placing new contracts than they have at any time for over a year. The opinion is also gaining ground that the crest in prices has been reached, with the possible exception of steel plates and tin plate, and consumers believe they will not lose anything by waiting, perhaps two or three months, to place orders for second half material. In the meantime, the pressure on the steel mills for deliveries is as strong as ever, with the shortage in cars and motive power holding back shipments to a great extent. The supply of cars is a little better, but is still far from being satisfactory. In many cases where cars are furnished and material is loaded, there is a long wait before motive power can be secured to move them. There were no advances in prices during the week, the first time this has been the case for many months, but the whole market is strong. Export demand for pig

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

	Jan. 10, 1917.	Jan. 3, 1917.	Dec. 13, 1916.	Jan. 12, 1916.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	\$30.00	\$29.50	\$29.50	\$20.00
No. 2, Valley furnace...	31.00	31.00	31.00	18.50
No. 2, Southern, Cin'ti...	25.90	25.90	25.90	17.90
No. 2, Birmingham, Ala...	23.00	23.00	23.00	15.00
No. 2, furnace, Chicago*	30.00	30.00	30.00	18.50
Basic, del'd, eastern Pa.	30.00	30.00	30.00	19.50
Basic, Valley furnace...	30.00	30.00	30.00	17.75
Bessemer, Pittsburgh...	35.95	35.95	35.95	21.45
Malleable Bess., Ch'go*	30.00	30.00	30.00	19.00
Gray forge, Pittsburgh...	29.95	29.95	29.95	18.45
L. S. charcoal, Chicago...	31.75	31.75	31.75	19.25

Rails, Billets, etc., Per Gross Ton:

Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh...	60.00	60.00	55.00	32.00
O.-h. billets, Pittsburgh...	60.00	60.00	55.00	33.00
O.-h. sheet bars, P'gh...	60.00	60.00	55.00	35.00
Forging billets, base, P'gh	80.00	80.00	80.00	55.00
O.-h. billets, Phila.	60.00	60.00	60.00	42.00
Wire rods, Pittsburgh...	75.00	70.00	70.00	42.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	3.159	3.159	3.159	2.259
Iron bars, Pittsburgh...	3.25	3.25	3.25	1.95
Iron bars, Chicago...	3.00	3.00	2.75	1.75
Steel bars, Pittsburgh...	3.00	3.00	3.00	2.00
Steel bars, New York...	3.169	3.169	3.169	2.169
Tank plates Pittsburgh...	4.25	4.25	4.25	2.25
Tank plates, New York...	4.419	4.419	4.419	2.419
Beams, etc., Pittsburgh...	3.25	3.25	3.25	1.90
Beams, etc., New York...	3.419	3.419	3.419	2.069
Skelp, grooved steel, P'gh	2.85	2.85	2.85	1.80
Skelp, sheared steel, P'gh	3.00	3.00	3.00	1.90
Steel hoops, Pittsburgh...	2.45	3.25	3.25	2.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	Jan. 10, 1917.	Jan. 3, 1917.	Dec. 13, 1916.	Jan. 12, 1916.
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	4.50	4.50	4.25	2.60
Sheets, galv., No. 28, P'gh	6.25	6.25	6.00	4.75
Wire nails, Pittsburgh...	3.00	3.00	3.00	2.10
Cut nails, Pittsburgh...	2.95	2.95	2.95	2.00
Fence wire, base, P'gh...	2.95	2.95	2.95	1.95
Barb wire, galv., P'gh...	3.85	3.85	3.85	2.95

Old Material, Per Gross Ton:

Iron rails, Chicago...	\$27.00	\$27.00	\$29.00	\$17.50
Iron rails, Philadelphia...	28.00	28.00	27.00	19.50
Carwheels, Chicago...	19.00	19.00	22.00	14.75
Carwheels, Philadelphia...	22.00	22.00	22.50	16.50
Heavy steel scrap, P'gh...	23.00	23.00	27.00	17.50
Heavy steel scrap, Phila...	22.00	23.00	24.00	16.50
Heavy steel scrap, Ch'go	21.50	21.50	23.50	15.50
No. 1 cast, Pittsburgh...	20.00	20.00	23.00	15.25
No. 1 cast, Philadelphia...	20.00	21.00	21.00	17.00
No. 1 cast, Ch'go (net ton)	15.50	15.50	16.50	13.50
No. 1 RR. wrot, Phila...	27.00	27.00	27.00	22.00
No. 1 RR. wrot, Ch'go (net)	23.50	23.50	26.00	16.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$8.50	\$9.50	\$7.50	\$2.50
Furnace coke, future...	5.00	5.00	4.00	2.50
Foundry coke, prompt...	10.00	10.00	8.00	3.50
Foundry coke, future...	6.50	6.50	6.00	3.25

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	27.75	29.50	35.50	24.00
Electrolytic copper, N. Y.	27.75	29.50	35.50	23.87½
Spelter, St. Louis...	9.25	9.50	11.50	17.25
Spelter, New York...	9.50	9.75	11.75	17.50
Lead, St. Louis...	7.32½	7.35	7.80	5.75
Lead, New York...	7.50	7.50	7.90	5.90
Tin, New York...	42.50	43.00	43.00	41.50
Antimony (Asiatic), N. Y.	14.25	14.50	14.00	41.00
Tin plate, 100-lb. box, P'gh.	\$7.00	\$7.00	\$6.50	\$3.75

iron, shell steel, plates, and shapes and tin plate is still heavy, and this is helping very much to sustain the market.

Pig Iron.—Basic inquiry is better and export demand is heavy. Last week a sale of 6000 tons of standard Bessemer iron for Italy was made—1000 tons a month, June to November—and another sale of 7500 tons has been closed, presumably for Italy or France, deliveries over four or five months, both at \$35, Valley furnace. Some small lots of Bessemer are reported to have been sold to domestic consumers at \$35.50 and even \$36 but spot delivery was wanted and that forced a premium. A sale of 3000 tons of basic iron has been made by a local furnace—500 tons a month February to July—on the basis of \$30, Valley furnace. There is not much inquiry for foundry iron, for which some sellers are quoting \$32, but the majority of sales the past two or three weeks have been at \$31 or less. Last week's quotations are continued as follows: Standard Bessemer iron, \$35; basic, \$30 to \$31; gray forge, \$29; malleable Bessemer, \$30, and No. 2 foundry, \$31 to \$32, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 95c. per ton.

Later by Telegraph.—A sale of 8000 tons of basic has been made for export to be delivered up to fourth quarter at \$35, Valley, or better. Inquiries have come out for about 25,000 tons.

Ferroalloys.—There is a veritable famine in 50 per cent ferrosilicon, due to the Canadian Government shutting off Canadian electric power, on which our Niagara Falls smelters depended. Last week one open-hearth steel plant that was in distress for ferrosilicon offered as high as \$200 per ton for a few tons for prompt shipment, but could not get it. It may be some time before the situation is relieved. Reports are that there have been sales recently of 6000 to 8000 tons of English 80 per cent ferromanganese, part for delivery in first half and the remainder for shipment over all of this year, at about \$164, seaboard. No guarantee was given in these sales as to deliveries. Domestic 80 per cent ferromanganese is quoted from \$170 to \$175 at furnace, and the market is very strong. English 80 per cent ferromanganese is quoted at \$160 to \$164, seaboard; 18 to 22 per cent spiegeleisen, \$50 to \$55, and 25 to 30 per cent at \$65 to \$75, delivered; 50 per cent ferrosilicon for delivery next

year, in lots up to 100 tons, at \$100; 100 tons to 600 tons, \$99, and over 600 tons, \$98, all per gross ton, f.o.b., Pittsburgh; 9 per cent ferrosilicon, \$39 to \$41; 10 per cent, \$40 to \$42; 11 per cent, \$41 to \$43; 12 per cent, \$42 to \$44; 13 per cent, \$43.50 to \$45.50; 14 per cent, \$45.50 to \$47.50; 15 per cent, \$47.50 to \$49.50, and 16 per cent, \$50 to \$52; 7 per cent silvery, \$29.50 to \$30; 8 per cent, \$30 to \$31; 9 per cent, \$30.50; 10 per cent, \$31; 11 per cent, \$32, and 12 per cent, \$33. These prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of \$2 per gross ton to the Pittsburgh district.

Plates.—A local producer is said to have sold 12,000 to 15,000 tons of sheared plates for export, delivery in second half, at about 4c., Pittsburgh. Still higher prices are predicted, due to the continued demand from shipyards and carbuilders. One inquiry is in the market for upward of 60,000 tons for delivery to a Western shipyard over all of this year. Inquiry for steel cars is not heavy. The Standard Steel Car Company has taken 1000 composite hopper cars for the Baltimore & Ohio and 100 steel hoppers for the Atlantic Coast Line. Plate mills are filled for months ahead and sheared plates for fairly prompt shipment readily bring 4.50c. to 5c. at mill. The nominal price of the Carnegie Steel Company on sheared plates is 3.60c. at mill, with no promise of delivery, while other makers are quoting from 4c. to 5c. and higher, the price depending on the size of the order and the delivery wanted.

Steel Rails.—The demand for light rails from the coal mining interests is still active, but for standard sections is dull. We quote new light rails as follows: 25 to 45 lb., \$50; 16 to 20 lb., \$51; 12 and 14 lb., \$52; 8 and 10 lb., \$53, in carload lots, f.o.b., mill, with usual extras for less than carloads. Standard section rails of Bessemer stock are held at \$38, and open-hearth, \$40, per gross ton, Pittsburgh.

Structural Material.—Inquiry is active, but local fabricators are not taking much new business as they are filled up so far ahead they cannot make the deliveries wanted. The American Bridge Company has taken two steel hulls for seagoing vessels for an Eastern shipyard, requiring about 4500 tons. These are shipped broken down and then erected at the shipyard. The same in-

terest has taken about 5500 tons for a freight house office building and viaduct for a Western railroad. The Atlantic Coast Line has an inquiry out for 5000 to 6000 tons of steel for a bridge across the James River near Richmond, Va., to replace a smaller structure, and the General Electric Company is inquiring for about 1700 tons for extensions to its plant at Erie, Pa. We quote beams and channels up to 15 in. at 3.50c. to 4c., depending on the size of the order.

Sheets.—Makers report the demand as urgent as at any time in the past. The output of the mills is largely sold through the first quarter and partly through the second, and specifications against contracts are active. Deliveries of sheet bars are still unsatisfactory and this is holding down the sheet output to some extent. On the other hand, several mills that have export orders for high carbon billets on which there is a very large profit are not operating their sheet mills in full. General market prices of the large makers are 4c. on blue annealed sheets, all gages; 4.50c. on No. 28 Bessemer black, and from 6.25c. to 7c. and higher on No. 28 galvanized. These prices, however, are nominal to some extent, as mills naming them have their output sold up for some time. We quote blue annealed sheets, Nos. 3 to 8, at 4c. to 4.25c.; box annealed, one pass, Bessemer cold-rolled sheets, No. 28, 4.50c. to 5c.; No. 28 galvanized, 6.25c. to 7.50c.; No. 28 tin-mill black plate, 4.25c. to 4.50c., all f.o.b. mill, Pittsburgh. These prices are for carloads or larger lots, and the higher prices quoted are for reasonably prompt shipment.

Tin Plate.—Export inquiry is enormously heavy. One inquiry is said to be for upward of 2,000,000 boxes, for delivery over the remainder of this year, but nearly all leading mills refused to quote on it, as they are sold up so far ahead. There is some discussion among makers about the time coming to name the price for delivery beyond the first half of this year, and a disposition to name a price only for third quarter, naming a price for fourth quarter at a later date. On current orders prices on bright tin plate range from \$7 to \$7.50 and a few mills are naming \$8 per base box. The consuming trade is pretty well covered over the second half, and some of the larger tin plate mills have practically their entire output sold up over all of this year. We quote the market for delivery in the first half at \$7 to \$8 per base box, f.o.b., mill. We quote I. C. terne plate, 107 lb., at \$7.15 to \$7.65, and 200 lb. carrying 8-lb. coating, at \$11, the usual advances applying for heavier weights and coatings.

Shafting.—Large consumers are coming in the market with inquiries for second quarter, and some contracts have been closed on the basis of 20 and 15 per cent off list. Several makers are catching up on deliveries to some extent and are now promising shipments in two or three months on nearly all sizes from date of order. The output of shafting in 1916 was much the heaviest in any one year in the history of the trade, several leading makers having made large additions to capacity which became operative in the early part of the second half. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—Makers report that jobbers have placed fairly large contracts for railroad spikes for delivery in the first half at the full price of \$3.40, base. New spike inquiry is fairly active. The Western Maryland is in the market for 1000 kegs, and the Southern Pacific has sent out inquiries for 93,829 kegs, deliveries to start in September, 1917, and extend through to December, 1918. Two makers have refused to quote on this inquiry for delivery beyond the first half of this year. Makers report the new demand for track bolts as active and prices firm. Shipments of spikes and track bolts are held up seriously by the car shortage. We quote track bolts with square nuts at 4.85c. to 5c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 10c. to 15c. We quote railroad spikes as follows: 9/16 in. and larger, \$3.40, base; 7/16 and

1/2 in., \$3.50, base; 5/16 and 3/8 in., \$3.75, base; boat spikes, \$3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—The belief is growing that perhaps some of the larger makers have decided that prices are amply high and will not advance them further. Specifications against contracts, which were quiet prior to the holidays, are showing some increase, but are not so heavy as several months ago. The export inquiry for wire and wire nails is still quite active, but local mills are not quoting freely on such business, as their output is needed for the domestic trade. Regular prices in effect at this writing are as follows: Wire nails, \$3, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$3.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.95; galvanized wire, \$3.65; galvanized barb wire and fence staples, \$3.85; painted barb wire, \$3.15; polished fence staples, \$3.15; cement-coated nails, \$2.90, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to the point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 53 per cent off list for carload lots, 52 per cent for 1000-rod lots, and 51 per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—The export inquiry is heavy. From Canada alone inquiries have come in the past week for 10,000 tons or more, with other inquiries from Asia and South America. Domestic mills are filled up for months, and rods for prompt delivery would command almost any price. Ordinary soft Bessemer and open-hearth rods have sold at \$75 and \$80 per ton, and high carbon rods have been quoted as high as \$90, f.o.b. New York, for export shipment.

Iron and Steel Bars.—Mills report implement makers, carbuilders and other large consumers specifying freely against contracts for steel bars. While shipments are heavy, they would be much larger were it not for the car shortage. The nominal price of the Carnegie company on steel bars is 3c. at mill, with no promise of delivery, while other makers are quoting from 3c. to 3.25c. at mill for delivery in second and third quarters. Makers report a heavy demand for reinforcing steel bars and for refined iron bars, with prices very firm. We quote refined iron bars at 3.25c. and railroad test bars at 3.40c. in carload lots, f.o.b. Pittsburgh.

Nuts and Bolts.—Makers state that the recent advance in prices of about 5 per cent is firmly held. The unsatisfactory deliveries of steel by the mills are still holding down the output of nuts and bolts, and shipments are also restricted by the shortage in cars and motive power. Discounts are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 and 2 1/2 per cent; large 30 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 per cent; small, cut thread, 40 and 10 per cent; large, 35 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 per cent; large, 30 per cent. Bolt ends, h. p. nuts, 35 and 5 per cent; with c. p. nuts, 30 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts, h. p. sq. and hex., blank, \$2.50 off list, and tapped, \$2.30 off; nuts, c. p. c. and t. sq., blank, \$2.10 off, and tapped, \$1.90 off; hex., blank, \$2.50 off, and tapped, \$2.30 off. Semi-finished hex. nuts, 50, 10 and 5 per cent. Finished and case-hardened nuts, 50, 10 and 5 per cent.

Rivets 7/16 in. in diameter and smaller, 40 and 10 per cent.

Hoops and Bands.—The Carnegie price on steel hoops remains at 3.50c. and on steel bands at 3c. at mill, but with no promise of delivery. Other makers are quoting 3.50c. to 3.75c. on steel hoops and from 3c. to 3.25c. on steel bands, mostly for delivery in the second quarter.

Rivets.—The new demand is not heavy, as nearly all consumers are covered over the first quarter. Specifi-

cations against contracts are coming in freely. Makers quote buttonhead structural rivets, $\frac{1}{2}$ in. in diameter and larger, \$4.25 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Cold-Rolled Strip Steel.—Buying is quiet. Consumers are covered through the first quarter and the mills have not yet opened their books for the second quarter. Some makers are inclined to ask higher prices for the second quarter. On current orders for reasonably prompt shipment makers quote \$7 for fair-sized quantities up to \$7.50 per 100 lb. for small lots. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wrought Pipe.—Leading mills have very little lap-weld pipe to sell before the second half of this year, but on butt-weld sizes they can make shipments in six to eight weeks. So far as known, the order for 500 miles of 8-in. pipe for the Sinclair Oil & Refining Company has not been placed. Although the year 1916 was a record year in output of pipe and high prices, some makers believe that 1917 will show a still larger output and that high prices will prevail through the year. The Jones & Laughlin Steel Company will soon start up another butt-weld and another lap-weld furnace in its new mills at Aliquippa, Pa. So far it has made only up to 8-in. pipe, but eventually it will make up to 16-in. The Republic Iron & Steel Company is now making up to 16-in. Discounts as effective from Dec. 30 are given on another page.

Boiler Tubes.—Prices on both locomotive and merchant tubes are largely nominal, as the mills are filled up on both grades for six to nine months. Premiums over regular prices are readily paid for fairly prompt shipments. Discounts are given on another page.

Old Material.—Not enough scrap is being sold by dealers to consumers to establish prices. A good deal of scrap is pressing the market to find sale, but consumers are not buying, believing prices will be lower. The scrap yards of the various steel companies are filled with cars and others are on the way, so that a buying movement is not likely for some little time. In the absence of any important sales, prices for delivery in Pittsburgh and at other consuming points that take Pittsburgh freight rates, per gross ton, are nominally as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$23.00 to \$24.00
No. 1 foundry cast	20.00 to 21.00
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	26.00 to 27.00
Hydraulic compressed sheet scrap	20.00 to 20.50
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	16.00 to 16.50
Bundled sheet stamping scrap	14.50 to 15.00
No. 1 railroad malleable stock	20.00 to 21.00
Railroad grate bars	10.50 to 11.00
Low phosphorus melting stock	28.00 to 29.00
Iron car axles	43.00 to 44.00
Steel car axles	43.00 to 44.00
Locomotive axles, steel	45.00 to 46.00
No. 1 busheling scrap	17.00 to 18.00
Machine-shop turnings	11.50 to 12.00
Old carwheels	19.00 to 20.00
Cast-iron borings	12.00 to 12.50
*Sheet bar crop ends	25.00 to 26.00
No. 1 railroad wrought scrap	22.00 to 23.00
Heavy steel axle turnings	15.50 to 16.00
Heavy breakable cast scrap	18.00 to 18.50

*Shipping point.

Coke.—Deliveries of coke to the blast furnaces are more satisfactory, the supply of cars being better. Best grades of furnace coke for prompt shipment are held at \$8.50 to \$9 per net ton at oven. Several fairly large lots of furnace coke for delivery in the first quarter have been sold at \$8 at oven. It is known that several furnaces that have not yet contracted for their supply of coke for the first half would readily pay \$5 for it, but none of the makers will sell at that price. Reports are circulating that some furnace coke has been sold at \$6 for the first half, but this is regarded as above the market. Certain contracts taken last fall on furnace coke at \$2.65 and \$2.75 at oven for first half delivery are not being filled by the sellers and

the furnaces that placed them have been compelled to go in the open market and buy coke at prices ranging from \$6 to \$12. Legal action is threatened. We quote best grades of furnace coke for prompt shipment at \$8.50 to \$9 per net ton at oven, and on contracts for first half delivery at \$6 to \$7. The latter are asking prices of the coke makers, no contracts for first half delivery having yet been made at them. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Dec. 30 as 331,911 net tons, a decrease over the previous week of 2037 tons.

The Reliance Iron & Coke Company, with main offices in Cincinnati, Ohio, has opened a Pittsburgh office in the Frick Annex Building, with R. S. Fox in charge. The company handles pig iron of all kinds and blast-furnace and foundry coke.

Philadelphia

PHILADELPHIA, PA., Jan. 9, 1917.

In all products, save plates, a quieter tendency is apparent, but the demand for steel is nevertheless very heavy. Less discussion is heard of the high prices which are asked in every direction. Some notable business has been done with shipyard interests in the Far East, one lot of 20,000 tons of plates and shapes having been taken for last half delivery at 6c., Pittsburgh, while for 5000 tons of mixed ship material, second quarter delivery, 6.25c. was paid. Structural shapes are in such demand that one mill is reluctant to sell at the 3.50c., Pittsburgh, base it has been quoting. Several large building projects indicate a still heavier demand for shapes. Pig iron is quiet, but exceedingly firm, and the trade is of the opinion that a spot market will develop at an early day. The main question with both sellers and buyers of pig iron is that of deliveries. The coke situation is but little changed, though perhaps a trifle easier. Consumers of old material still show hesitancy in the matter of buying and the prices of several items are easier. Heavy melting steel scrap has been taken in moderate-sized lots at \$22 and \$22.50.

Pig Iron.—Both buyers and sellers are more concerned with deliveries than with new business. Since the holidays buying has been light. The few sales which have been made were mostly of small prompt lots wanted to fill in the gaps created by the failure of deliveries on contract. It frequently happens that where a consumer cannot get a delivery from one maker he can get something from another. The market is extremely firm and less is heard of concessions. Furnace stocks are about as low as they can be, and what iron is on the furnace banks is there chiefly because of transportation difficulties. The latter continue to hamper the trade as much as deliveries of finished products. The situation is a puzzling one to shippers, inasmuch as one day embargoes will be on certain points whereas the next day they are off. Again, there is the delay caused by the effort the railroads are making to get their own cars back on their own rails. The iron trade of this section is of the opinion that before long a vigorous spot market will develop. Apparently the lowest price for prompt delivery of eastern Pennsylvania No. 2 X is \$30, furnace, with some makers asking up to \$32, furnace. One brand of No. 2 X is obtainable at \$31.90, and another at \$30.84, Philadelphia, the furnace price of each being \$30. Not much Virginia iron is obtainable where fresh sales are concerned, but shipments are being made with comparative ease, the Norfolk & Western Railway being fairly generous with its cars. For 3 to 4 per cent silicon iron, \$29, furnace, or \$31.75, Philadelphia, is quoted, and No. 2 X of the same make would be under this figure, but the furnace in question has none of the latter to sell. Talk of export business is heard a great deal, but one interest, while admitting the large aggregate inquiry, questions the reported volume of sales for the reason that in endeavoring to arrange a

shipment to Genoa, Italy, the prohibitory freight rate of \$45 a ton was encountered. No activity in basic is reported, but there has been some business in standard low phosphorus, and its price is higher, makers now asking \$54 to \$55, according to specifications. It has sold for nearby delivery at \$55, delivered. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry.....	\$30.00 to \$31.00
Eastern Pa. No. 2 plain.....	29.50 to 30.50
Virginia No. 2 X foundry.....	30.00 to 31.00
Virginia No. 2 plain.....	29.75 to 30.75
Gray forge	28.25 to 28.75
Basic	30.00
Standard low phosphorus.....	54.00 to 56.00

Iron Ore.—Arrivals of foreign ore at this port in the two weeks ended Jan. 6 consisted of 7600 tons from Cuba and 11,897 tons from Spain.

Plates.—One lot of ship material, amounting to 20,000 tons of plates and shapes, has been placed at 6c., Pittsburgh, for last half delivery to the Far East, presumably Japan, while for 5000 tons of ship material for second quarter delivery to a Japanese buyer 6.25c. is to be paid. Both sales were made through brokers. The demand for ship plates shows no cessation, several bids being out on European as well as domestic inquiries. A mill which is being offered business amounting to twice its production has advanced its quotation for universal plates \$15 a ton, or to 4.75c., Pittsburgh, equal to 4.909c., Philadelphia. Its deliveries on these plates, which for a long time lagged behind the sheared product, are now five and six months away. For tank plates it quotes 5.159c., Philadelphia, and for ship steel 6.159c. The most urgent demand, next to the shipyards, comes from the car and locomotive builders. There is a correspondingly heavy demand for charcoal-iron boiler tubes. The company above referred to has tank steel sold to December, and ship plates into the first quarter of 1918. In other quarters tank steel is still procurable from Eastern makers at 4.659c. to 4.909c., Philadelphia, but the quantity is limited.

Ferroalloys.—No change is reported in the quotations for 80 per cent ferromanganese. The domestic makers ask \$175, delivered, for any position; agents of foreign makers ask \$164, seaboard, but have little to offer this side of May or June. A steel company in northern New Jersey is inquiring for 500 tons of prompt. In the past two weeks 924 tons of English ferromanganese arrived at this port. Fifty per cent ferrosilicon is scarce, and its quotation largely nominal at \$100, Pittsburgh, for carloads, and \$99 for 100 tons or more. Spiegeleisen is unchanged at \$55 to \$60, furnace.

Billets.—Soft open-hearth rerolling billets are quoted at \$60, with few available, and forging steel billets at \$75 to \$80. Discard shell steel bars are quoted at \$40 to \$45, although similar material for forging commands \$54 to \$56 a ton.

Bars.—The quotations for steel bars range from 3.159c. to 3.409c., Philadelphia, with the latter the more generally accepted price. One maker has supplied its customers for the second quarter at the lower price, the only complaint of the buyers being that their allotment was not as large as they would like it to be. Iron bars are unchanged at 3.159c., Philadelphia, carload lots.

Structural Material.—Deliveries continue to grow tighter, and there is a consequent tendency to ask higher prices for structural shapes. A mill which has been quoting 3.659c., Philadelphia, is not now so ready to accept orders at that figure. Present office building and factory construction is largely of reinforced concrete, but there is nevertheless an active demand for shapes. Small quantities produced incidental to rollings on contracts are readily placed at 3.75c. Worth Brothers have placed a contract with the Lackawanna Bridge Company for 1300 tons of shapes for their new plant at Claymont, Del. The Virginia Bridge & Iron Works will fabricate 600 tons for the Cherry Street bridge, Philadelphia. L. F. Shoemaker & Co. have the contract for a machine shop for the Baldwin Locomotive Works at Eddystone, requiring 700 tons. The Government is advertising for bids on several buildings

at the League Island Navy Yard which will require 10,000 to 12,000 tons. The contemplated factory for the Westinghouse Electric & Mfg. Company at Essington is up again. It will require 5000 to 6000 tons. The quotations for shapes run from 3.659c. to 4.159c., Philadelphia. A lot of 2500 tons, including shapes and plates, for shipment to the Far East, through a broker, brought 4c., Pittsburgh.

Sheets.—No. 10 blue annealed sheets are unchanged at 4.909c., Philadelphia, with all gages well sold up for nearby delivery.

Coke.—No uniformity exists in the quotations for prompt coke, prices varying from day to day, with the necessities of the buyers determining what they will pay. Spot furnace has been purchased at \$9.50 and upward per net ton at oven. Nominal contract prices are around \$6 to \$6.50. Prompt foundry ranges from \$10 to \$10.50, and contract at \$7.50 to \$8.50. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—The market continues to be characterized by hesitancy on the part of consumers, but there is more doing than in the previous week. Heavy melting steel has been bought in moderate quantities at \$22 and \$22.50, and some of the other items are easier. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$22.00 to \$22.50
Old steel rails, rerolling.....	30.00 to 31.00
Low phos. heavy melting steel scrap.....	33.00 to 36.00
Old steel axles (for export).....	45.00
Old iron axles (for export).....	45.00
Old iron rails	28.00 to 29.00
Old carwheels	22.00 to 22.50
No. 1 railroad wrought.....	27.00 to 28.00
Wrought-iron pipe	18.00 to 19.00
No. 1 forge fire.....	15.50 to 16.50
Bundled sheets	15.50 to 16.50
No. 2 busheling	13.00 to 14.00
Machine-shop turnings	13.00 to 13.50
Cast borings	14.00 to 14.50
No. 1 cast.....	20.00 to 21.00
Grate bars, railroad	16.00 to 16.50
Stove plate	17.00 to 17.50
Railroad malleable	18.50 to 19.00

The Charles Dreifus Company, dealer in iron and steel scrap, has removed its Philadelphia branch office from the Pennsylvania Building to larger quarters in suite 1312, Widener Building.

Buffalo

BUFFALO, N. Y., Jan. 8, 1917.

Pig Iron.—There is some revival of buying effort, but confined largely to emergency requirements, many melters finding themselves short of iron as a result of the car shortage. Important inquiries of the past two or three days include one of 8000 tons of basic, for second and third quarter delivery; one for 12,000 tons of gray forge for first half delivery; also an inquiry for 500 tons of No. 2 iron for January and February delivery. Furnacemen, however, have little, if any, untaken space on their order books for months ahead, except a few scattering lots. Many melters are also asking furnaces to anticipate deliveries, calling for large quotas on contracts not yet due, but with which furnaces in a majority of instances are unable to comply. Prices remain firm, \$35, flat, at furnace, being the minimum that is being asked and \$35.50 is being obtained for carload lots where it can be furnished for immediate shipment. We quote as follows for last quarter and first half delivery, f.o.b. furnace, Buffalo:

High silicon irons.....	\$35.00 to \$35.50
No. 1 foundry	35.00 to 35.50
No. 2 X foundry	35.00 to 35.50
No. 2 plain	35.00 to 35.50
No. 3 foundry	35.00 to 35.50
Gray forge	35.00 to 35.50
Malleable	35.00 to 35.50
Basic	35.00 to 35.50
Bessemer	35.00 to 35.50
Charcoal, according to brand and analysis	35.00 to 35.50

Finished Iron and Steel.—Inquiry locally is quiet, with comparatively few transactions, mills and agencies having little to offer and thus making few quotations. There are a few inquiries for last-half delivery, but mills are unwilling to open books for such business. There

is some further inquiry from Canadian sources for ship-building material, together with some inquiry for tin plate.

Old Material.—A number of inquiries are out for heavy melting steel and old carwheels for export, entailing large tonnages and orders are expected to be closed within two or three days covering at least a considerable portion of the quantities under negotiation. Prices for these commodities thus remain as firm as for the week previous. The price offered for turnings is lower than a week ago, but these offers are from dealers only and no large sales have been made at figures under the prices named in the schedule below. There are a number of embargoes in force which have a tendency to hold back shipments and in some cases the materials affected by the embargoes have been sold from \$1 to \$2 per ton under current prices to relieve the car situation; but this is reflected to a limited extent only in price schedules, which remain about the same as a week ago. It is doubtful if any large tonnage covering an extended delivery period could be obtained at the present asking prices. There is a disposition on the part of a number of consumers to hold off on buying temporarily on account of the difficulty in procuring cars for shipping finished products. We quote dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$26.00 to \$27.00
Low phosphorus	32.00 to 34.00
No. 1 railroad wrought	30.00 to 31.00
No. 1 railroad and machinery cast	23.00 to 24.00
Iron axles	45.00
Steel axles	45.00
Carwheels	23.00 to 24.00
Railroad malleable	23.00 to 24.00
Machine shop turnings	11.50 to 12.00
Heavy axle turnings	17.50 to 18.00
Clean cast borings	11.50 to 12.00
Iron rails	25.00 to 26.00
Locomotive grate bars	15.50 to 16.00
Stove plate	16.00 to 16.50
Wrought pipe	17.00 to 17.50
No. 1 busheling scrap	21.50 to 22.50
No. 2 busheling scrap	15.00 to 15.50
Bundled sheet scrap	15.00 to 16.00

Cleveland

CLEVELAND, OHIO, Jan. 9, 1917.

Iron Ore.—Ore on Lake Erie docks at the close of navigation amounted to 10,167,760 gross tons, breaking all former records. The largest previous balance was on Dec. 1, 1912, when it totaled 10,053,836 tons. As the December receipts are usually very light, the dock balance is reckoned as of Dec. 1, but with the December dock receipts included. Owing to the unusually large amount of ore brought down last December, the dock receipts during the month added over 200,000 tons to the amount on docks Dec. 1. The market is inactive. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, \$5.95; Mesaba Bessemer, \$5.70; old range non-Bessemer, \$5.20; Mesaba non-Bessemer, \$5.05.

Coke.—The coke situation has eased up somewhat, there being an improvement in shipments to blast furnaces, but one Cleveland stack, the Emma furnace of the American Steel & Wire Company, is still banked. Prompt shipment of Connellsville foundry coke is quoted around \$10.50 to \$11.50 per net ton at oven. A local sale of Indianapolis by-product coke is reported at \$8 at oven for the first half. Virginia foundry coke is quoted at \$7.50 to \$8.50 for delivery during the year.

Pig Iron.—The market, after being inactive for several weeks, has again taken on some life. Several inquiries for foundry iron, mostly for the last half, have come out, including one for 1500 tons and others from 500 to 1000 tons. A Cleveland consumer has purchased 1000 tons of No. 2 foundry for the last half at \$30.45 at furnace. While the price has been nominally \$31 for some time, there is a spread in the market, as indicated by actual sales ranging from \$30 to \$31. The Cromwell Steel Company has purchased 37,500 tons of basic iron for its new plant in Lorain, Ohio, for delivery this year, starting with May, this tonnage being divided between two or three northern Ohio furnaces. The Southern iron market is quiet. We note the sale of two lots of 500 tons each of Tennessee iron for the

last half delivery at \$22 for No. 2. Alabama iron is quoted at \$23 to \$24.50 for the last half. Southern iron for the first half is very scarce. Sellers have been able to get some shipments through to northern Ohio points during the past few days, and it is expected that the embargo at Cincinnati will be lifted this week. Ohio silvery iron is reported being sold as high as \$40 for 8 per cent for the last half. We quote prices as follows, delivered Cleveland:

Bessemer	\$35.95
Basic	30.95
Northern No. 2 foundry	\$30.75 to 31.30
Southern No. 2 foundry	26.00 to 28.50
Gray forge	29.95
Ohio silvery, 8 per cent silicon	38.62 to 39.62
Standard low. phos. Valley furnace	50.00 to 51.00

Finished Iron and Steel.—There is a good demand for small lots of steel and specifications are fairly heavy, but new buying for extended future requirements is light. Consumers are apparently following a rather conservative policy in placing contracts for future needs. A Cleveland manufacturer has taken an additional large order for portable track for France, requiring 10,000 tons of 19-lb. rails and 2000 tons of track fastenings, and has placed the mill contracts for the rails and other steel. New inquiry for structural material is quiet. The demand for plates continues active, and local prices are very firm at 5c., Pittsburgh. One Eastern mill has advanced its price on universal plates to 4.75c. Bar iron is more active than for some time, considerable business being placed with a local mill by some of the railroads. We quote iron bars at 3c., Pittsburgh. Hard steel bars are in fair demand and there is a price range on these from 3c. to 3.25c., at mill. The demand for sheets continues very active, and there is a wide range of prices. One Ohio mill is quoting black sheets at 4.50c., but other mills are asking higher prices. We quote sheets at 4.50c. to 5.50c., at mill, for No. 28 black, 4.25c. to 5c. for No. 10 blue annealed, and 6.50c. to 7.50c. for No. 28 galvanized. Warehouse prices are 3.25c. for steel bars under 2 in., 3.95c. for structural material, 4.60c. for plates, 4.75c. for hoops, 5c. for black sheets, and 4.75c. for blue annealed sheets.

Bolts, Nuts and Rivets.—Considerable new bolt and nut business is coming out. The volumes of specifications on contracts that expired at the end of the year were very heavy and manufacturers are as far behind as ever on deliveries. Prices are firm. The demand for rivets on contracts continues active. We quote rivets at 4.25c., Pittsburgh, for structural, and 4.35c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{4}$ x 6 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40 and 2 $\frac{1}{2}$; larger or longer, 30 and 5. Machine bolts with h.p. nuts, $\frac{3}{4}$ x 4 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 10; larger or longer, 35 and 5. Lag bolts, cone point, 50. Square and hexagon h.p. nuts, blank, \$2.50 off the list; tapped, \$2.30 off. C.p.c. and t. hexagon nuts, all sizes, blank, \$2.25 off; tapped, \$2.00 off. Cold pressed semi-finished hexagon nuts, 50, 10 and 5 off.

Old Material.—The decline in prices has apparently stopped and the market is fairly firm at the quotations that have prevailed during the past week. Dealers are asking slightly higher prices for heavy melting steel and borings and one or two other grades. The market is dull. Local mills are filled up and are out of the market, but there is some activity between dealers. Canton has taken on some heavy melting steel scrap at \$23. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$21.00 to \$22.00
Steel rails, rerolling	29.00 to 29.00
Steel rails under 3 ft.	25.00 to 26.00
Iron rails	29.00 to 30.00
Steel car axles	48.00 to 49.00
Heavy melting steel	22.00 to 22.50
Carwheels	20.00 to 20.50
Relaying rails 50 lb. and over	37.00 to 38.00
Agricultural malleable	15.00 to 15.60
Railroad malleable	20.50 to 21.00
Steel axle turnings	16.50 to 17.00
Light bundled sheet scrap	14.50 to 15.00
Per Net Ton	
Iron car axles	\$44.00 to \$45.00
Cast borings	9.50 to 9.75
Iron and steel turnings and drillings	9.50 to 9.75
No. 1 busheling	17.50 to 18.00
No. 1 railroad wrought	24.00 to 25.00
No. 1 cast	17.75 to 18.25
Railroad grate bars	12.25 to 13.50
Stove plate	13.25 to 13.50

Cincinnati

CINCINNATI, OHIO, Jan. 10, 1917.—(By Wire.)

Pig Iron.—Foundrymen are not now disposed to contract for last half requirements. While there is some improvement in inquiry, sales in this territory are limited principally to first half delivery. Only a few small contracts have come to light lately, although some business is under negotiation with Ohio and Indiana consumers. A sale of 500 tons of Virginia foundry was made in Michigan for second quarter shipment. A southern Ohio melter bought 1200 tons of Southern foundry iron for shipment in the first half and another nearby sale of 500 tons is reported for the same delivery. The Ohio silvery and Bessemer ferrosilicon irons are held at top notch quotations. Based on an 8 per cent analysis, the former is quoted at \$36, furnace, and the latter all the way from \$45 to \$47 for 10 per cent. A Michigan melter purchased approximately 300 tons of Ohio silvery for shipment before July 1. Northern No. 2 foundry is unchanged at \$30, Ironton. The different freight embargoes change daily, but the situation has been much relieved by the consent of several Northern railroads to accept shipments for points along their lines. An inquiry has been received from Canada for a round tonnage of basic for shipment in the next four months. No nearby domestic basic users are in the market at present. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b., Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$26.40 to \$28.40
Southern coke, No. 2 f'dry and 2 soft.	25.90 to 27.90
Southern coke, No. 3 foundry.	25.40 to 27.40
Southern coke, No. 4 foundry.	24.90 to 25.40
Southern gray forge	24.40 to 26.40
Ohio silvery, 8 per cent silicon.	37.25 to 38.25
Southern Ohio coke, No. 1.	31.76
Southern Ohio coke, No. 2.	31.26
Southern Ohio coke, No. 3.	30.76
Southern Ohio malleable Bessemer.	31.26
Basic, Northern	31.26
Lake Superior charcoal	28.70 to 29.70
Standard Southern carwheel	27.90 to 28.40

(By Mail)

Finished Material.—Both the mill and warehouse business has slowed down, although if deliveries could be made promptly, orders for shipment in the first half of the year could be more plentiful. Railroad track accessories are rather quiet, although there has been a considerable amount of spike business lately. The near-by rolling mills are holding No. 28 galvanized sheets around 6.75c. to 7c., f.o.b. Cincinnati or Newport, Ky., and No. 28 black, 4.90c. to 5c. Local store prices are as follows: Wire nails, \$3.40 per keg base; barb wire, \$4.40 per 100 lb.; structural shapes, 3.90c.; plates, 4.70c.; No. 10 blue annealed sheets, 4.65c.; steel bars, 3.80c.; flat bars, 1 in. and over, 4.35c.; round-head rivets, 4.50c.

Coke.—Spot shipment prices have eased off a little. Some agents are disposed to take on foundry coke business, with shipments running through the entire year, around \$6 to \$7 per net ton at oven, Connellsville. In the Wise County field all the way from \$6.50 to \$7.50 is quoted. Pocahontas operators are slow in naming quotations, but nominal figures are about on a parity with those given for Wise County. No furnace coke has been sold lately.

Old Material.—Business is slow, and prices are still softening. While there has been no radical change, a general decline of about 25c. per ton is reported. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	\$14.00 to \$14.50
Old iron rails	24.25 to 24.75
Relaying rails, 50 lb. and up.	27.75 to 28.25
Rerolling steel rails	24.25 to 24.75
Heavy melting steel scrap.	20.25 to 20.75
Steel rails for melting	20.25 to 20.75
Per Net Ton	
No. 1 railroad wrought	\$21.00 to \$21.50
Cast borings	6.50 to 7.00
Steel turnings	6.50 to 7.00
Railroad cast	15.75 to 16.75
No. 1 machinery cast	17.50 to 18.00
Burnt scrap	9.75 to 10.25
Iron axles	32.50 to 33.00
Locomotive tires (smooth inside)	27.00 to 27.50
Pipes and flues	13.25 to 13.75
Malleable cast	14.75 to 15.25
Railroad tank and sheet.	11.75 to 12.25

St. Louis

ST. LOUIS, MO., Jan. 8, 1917.

Pig Iron.—Specifications on contracts are heavier and more urgent, and by the first of February new buying is expected. Transactions for the week were mostly in small lots, the largest sales being 300 tons of Southern high silicon and 500 tons of No. 2 Southern, and an inquiry for 1000 tons of No. 2 and No. 3 Southern.

Coke.—Easier conditions prevail, with prices somewhat lower for urgent lots. By-product coke is not quotable.

Finished Iron and Steel.—Little or no attempt is being made to negotiate contracts. One sale of 1400 tons of standard section steel rails, with accessories, was closed during the week for deferred delivery, while some contracts for light rails were taken. Orders for light rails for delivery at convenience of the mills continue very good. Specifications on contracts are freely made and urgently pressed. Track fastenings of every character are in sharper demand. Mills are also beginning to exercise the right to cancel balances which remain on the books beyond the allotted time. Movement out of warehouse continues active. We quote for stock out of warehouse as follows: Soft steel bars, 3.80c.; iron bars, 3.70c. to 3.75c.; structural material, 3.90c.; tank plates, 4.55c.; No. 10 blue annealed sheets, 4.70c.; No. 28 black sheets, cold-rolled, one pass, 5.30c.; No. 28 galvanized sheets, 7.50c.

Old Material.—There is very little buying, but the prices quoted are being firmly held. Lists out during the past week were 1000 tons from the Mobile & Ohio and 500 tons from the Union Pacific in a special list. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$27.00 to \$27.50
Old steel rails, re-rolling.	27.50 to 28.00
Old steel rails, less than 3 ft.	27.00 to 27.50
Relaying rails, standard section, subject to inspection	33.00 to 34.00
Old carwheels	20.50 to 21.00
No. 1 railroad heavy melting steel scrap	22.00 to 22.50
Heavy shoveling steel	19.00 to 19.50
Ordinary shoveling steel.	17.50 to 18.00
Frogs, switches and guards cut apart	22.00 to 22.50
Bundled sheet scrap.	13.50 to 14.00

Per Net Ton	
Iron angle bars	\$26.00 to \$26.50
Steel angle bars	22.00 to 22.50
Iron car axles	36.50 to 37.00
Steel car axles	37.50 to 38.00
Wrought arch bars and transoms.	27.50 to 28.00
No. 1 railroad wrought	22.50 to 23.00
No. 2 railroad wrought.	21.50 to 22.00
Railroad springs	23.50 to 24.00
Steel couplers and knuckles.	24.00 to 24.50
Locomotive tires, 42 in. and over, smooth inside	26.00 to 26.50
No. 1 dealers' forge.	18.00 to 18.50
Cast iron borings	9.00 to 9.50
No. 1 busheling	16.50 to 17.00
No. 1 boilers, cut to sheets and rings.	13.00 to 13.50
No. 1 cast scrap.	15.00 to 15.50
Stove plate and light cast scrap.	10.50 to 11.00
Railroad malleable	16.50 to 17.00
Agricultural malleable	14.00 to 14.50
Pipes and flues	14.00 to 14.50
Heavy railroad sheet and tank scrap.	14.50 to 15.00
Railroad grate bars	12.00 to 12.50
Machine shop turnings	9.50 to 10.00
Heavy axle and tire turnings.	12.50 to 13.00

Birmingham

BIRMINGHAM, ALA., Jan. 8, 1917.

Pig Iron.—Spot iron can be had at \$24 to \$25, f. o. b. Birmingham district furnaces, and warrant iron is offered at \$23, which, with brokerage, etc., added, is the equivalent of \$24 at furnace. For forward metal the nominal quotation of \$25 is made, but, where the interest really has iron to sell, \$24 will be taken. The leading interest accepts \$25 for spot, but still stands in a class by itself in naming \$22 as a last-half basis. The only sale of consequence reported in the week is one of 2,500 tons for second half delivery sold on the \$24 basis. Those furnacemen with some last half iron left are in no hurry to bill to capacity. The output will be increased this month by the blowing in of the third stack of the Republic. The outgo is heavier, pig iron moving with much more ease and in larger quantities. The foundry stock decrease, which was 30,000

tons in November, was probably as great, if not greater, in December. The feature of the 1916 production in Alabama was the great increase in basic metal, which went from 560,000 tons in 1915 to 960,000 tons in 1916, an increase of 70 per cent. The basic output constituted 35 per cent. of the total in 1916, as compared with 27 per cent in 1915. This increase was partly due to enlarged operations by the Tennessee and the American Steel & Wire companies, and partly to the 200,000 tons of basic ordered by the British Government from the Woodward and Sloss-Sheffield companies, a large portion of which has been already made and shipped. Furnace coke is hard to get in quantities desired, but thus far operations have not been greatly hampered, owing to the persistent revival at beehive plants, long idle. The December iron output was exceeded during the year only by that of October. We quote, per gross ton, f. o. b., Birmingham district furnaces, makers' prices, as follows:

No. 1 foundry and soft.....	\$24.50 to \$25.50
No. 2 foundry and soft.....	24.00 to 25.00
No. 3 foundry.....	23.50 to 24.50
No. 4 foundry.....	23.25 to 24.25
Gray forge.....	23.00 to 24.00
Basic.....	24.50 to 25.50
Charcoal.....	25.00 to 26.00

Cast-Iron Pipe.—High prices of pig iron, necessitating the high price of pipe and, added to this, the usual dull season of the year, have caused quite a lull in the pipe market. Orders coming in were scattering. The United States Cast Iron Pipe & Foundry Company has settled a labor dispute with its Bessemer workmen. We quote, per net ton, f. o. b. pipe shop yards, as follows: 4 in., \$39; 6 in., and upward, \$36, with \$1 added for gas pipe and special lengths.

Coke.—Long-term contracts for 1917 standard beehive foundry coke are being made on a basis of \$6 and \$7 per net ton at oven and there is no spot coke under \$10. Furnace coke, where obtainable, brings \$4.50 and as high as \$5, but there is little to be had. Warm weather cut into the coal stampede, but prices are still high, steam coal in large quantities bringing \$2.50 and \$3 and domestic coal \$5 and \$6 per ton delivered.

Old Material.—The scrap market is weaker. Peace talk, railroad embargoes and the stock market collapse seem to have had a generally lowering tendency. A fair volume of business goes on, however. We quote, per gross ton, f. o. b. dealers' yards, as follows:

Old steel axles.....	\$34.00 to \$36.00
Old steel rails.....	19.00 to 19.50
No. 1 wrought.....	18.00 to 19.00
Heavy melting steel.....	16.00 to 16.50
No. 1 machinery.....	17.00 to 18.00
Carwheels.....	14.00 to 15.00
Tram carwheels.....	14.00 to 15.00
Stove plate and light.....	10.50 to 11.00

San Francisco

SAN FRANCISCO, CAL., Jan. 1, 1917.

Inventory work has halted business for this week, but buying in most departments continued quite active up to Christmas. The first of the new year brings a general advance of \$2 per ton in practically all lines, owing to the prospective advance in freight rates. Foreign demand is unabated.

Bars.—One of the local mills has booked quite a heavy tonnage of Oriental business, and orders from that source are being placed with less facility, although prices are still below parity with the East, and there is occasionally some competition. Manufacturers' requirements are heavy, a feature being the demand for iron bars from shipbuilders. Deformed bars for reinforcing are in good demand. Resale prices on small lots stand at 4.25c. Very desirable orders for cargo lots might be placed direct with local mills as low as 3c., with 3.25c. the going price for delivery at mill's convenience.

Structural Material.—Small work is all that can be reported in the way of fabricating contracts. The steel contract for the Northern Pacific terminal building, Seattle, has been let to the Vulcan Mfg. Company.

Rails.—A strong demand is noted for light rails. Orders have been delayed somewhat owing to the high prices, but with relaying rails becoming scarce business is on the increase. An active buying movement for

mining, logging and industrial purposes is expected in the first and second quarters.

Plates.—While no tank or pipe propositions of exceptional magnitude are now in the market, a great deal of hydroelectric development is either under way or projected, and the coming year is expected to bring a heavy tonnage for such work. Marine business is absorbing all suitable material that can be secured, and while a great deal of export business is offered, little of it can be placed here. Distributive trade has been active, and the jobbing price on tank plates has been advanced to 5.30c. for small lots, or 5c. for carloads.

Sheets.—The situation in galvanized shows little change, supplies being light. Despite the high prices a fair tonnage of corrugated is being used for factory construction. It is difficult to place new business, though most mills are taking care of their regular trade fairly well.

Wrought Pipe.—Unfavorable weather has retarded business in the oil fields a little, though drilling continues active. Merchant sizes are quiet, which is rather hard to understand, as the plumbing trade reports business satisfactory, and there is considerable building.

Cast-Iron Pipe.—The latest advance has caused a general cessation of large business, either corporation or municipal; many buyers having anticipated their wants to some extent previously. Some small business is coming through for urgent needs, but the December tonnage has been light. On the basis of the expected freight advance Jan. 1, prices are quoted here at \$49 per net ton for 6-in. and over; \$52 for 4-in., and \$1 extra for class A and gas pipe.

Pig Iron.—Melting requirements show a tendency to increase gradually. Bookings for future delivery have been fairly large, but hardly up to expectations, and practically nothing has been contracted beyond the first half, as the trade is suspicious of present prices. Local values are somewhat unsettled, the latest quotation being around \$35 per gross ton, San Francisco, for shipment before the first of the year; and \$2 will be added on later shipments, due to the advance in freight.

Coke.—Contracting for extended delivery has been on a conservative scale, though a considerable tonnage has been booked, and a good many orders have been placed for prompt shipment. Values are very firm, as high as \$19 having been quoted recently.

Ferroalloys.—Ferromanganese is holding steady, with some of the larger buyers obtaining their supplies from local producers, who are becoming a larger factor in the market. Ferrosilicon is rather scarce, and stiffening as to value.

Old Material.—The local market is stronger, with a growing demand for steel melting scrap, and most of the easily obtainable holdings with convenient transportation have been used, or are in strong hands. Heavy steel scrap is now held at \$15 per gross ton, San Francisco, and some large sales have been made of various grades at \$11 to \$15. Cast-iron scrap also is firm, showing to some extent a reflection of the strength of pig iron. Little desirable scrap can now be had under \$16 per net ton, and small sales are made at considerably higher figures.

New York

NEW YORK, Jan. 10, 1917.

Pig Iron.—The domestic market simply drifts, and export trade is not as active as it was. The cost of vessel room is one of the drawbacks. However, a 5000-ton sale of Bessemer iron, to come from a Valley furnace in the Middle West, has been put through a local office for France, and an order has been given a selling firm for 2000 tons of Bessemer and 1000 tons of Southern foundry iron for Italy. Some fancy prices have been made on small lots of Bessemer iron, one sale of 200 tons of special Bessemer having been made for immediate export at \$47 at central Pennsylvania furnace. Inquiries for No. 2 X iron for shipment to Geneva, Switzerland, have come up to the extent of 2500 tons. The largest reported sale for domestic consumption was of 1000 tons of No. 2 X foundry par-

ticularly low in sulphur at \$32, eastern Pennsylvania furnace. Some small lots of Virginia iron have sold at \$29 at furnace for No. 2 X. Where government requisitioned vessels have carried pig iron or steel, sellers have been able to get space at \$30 for northern French or Mediterranean ports, but when they come into the open market they are met with quotations of \$45, \$50 and higher. These high freights are limiting business. It was shown one year ago that there is a limit beyond which foreign buyers cut down their purchases. The expected putting in of the Wharton furnaces means additional pig iron on the Eastern market, but this is offset in part by the passing of several Lebanon Valley furnaces into the hands of the Bethlehem Steel Company, which will in time withdraw its product from sale. Foundries generally are receiving iron as needed and in the main they are not troubled to get sufficient coke. Spot foundry coke is sold at \$11.50 at oven, though higher prices have been paid. We quote at tidewater for early delivery: No. 1 foundry, \$30 to \$31; No. 2X, \$29.50 to \$30.50; No. 2 plain, \$28.50 to \$29.50; Southern iron at tidewater, \$29 to \$30 for No. 1 and \$28 to \$29 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Outside of an inquiry for 2000 tons of ferromanganese from a large Canadian consumer, the largest one before the market is 500 to 1000 tons from an American steel maker, which, together with smaller ones, makes a total of 2000 tons for domestic consumption. Sales have been very few except of small lots, since the large one reported a week ago, and the quotation still stands at \$164, seaboard, for the British product and \$175, delivered, for the American which is being very firmly adhered to. British representatives are not active in the market and this is not surprising when it is pointed out that sales are being made to the Continent at \$170 to \$180 and higher. Prospects of fairly good receipts of alloy already contracted for are reported to be likely in January. The production by blast furnaces in this country in December exceeded 19,000 tons, making the total for the last quarter more than 60,000 tons, which is a record. Spiegeleisen is reported scarce for first half delivery at \$60, furnace. An inquiry of 500 to 1000 tons from a domestic consumer is before the market. Ferrosilicon, 50 per cent., is becoming scarcer, if anything, and some consumers are facing the unwelcome necessity of turning to other than their usual sources of supply. The contract price is still \$99 to \$100, but sales of small lots for early delivery command \$115 to \$120, delivered. The situation as to electric power in the Niagara district does not look any brighter for American users of Canadian power.

Structural Material.—While high prices undeniably have checked building of apartment houses, loft buildings and the like, expansion in industrial establishments continues. The latest and largest in this respect is the plant at Essington for the Westinghouse Electric & Mfg. Company, involving a foundry, machine shop, pattern storage building, etc., and taking 7700 tons. The initial contract has been signed for the structural work for the open-hearth furnace building of the Worth plate mill on the Delaware River, requiring 1500 tons, the Lackawanna Bridge Company, being awarded the contract and leaving perhaps 5000 tons of structural work still to be placed for this plant. The Baldwin Locomotive Works at Eddystone, Pa., has commissioned Lewis F. Shoemaker & Co., to erect a 700 ton structure; the General Electric has placed an 1100 ton foundry at Schenectady with the McClintic-Marshall Company, and the Ingersoll-Rand Company a 200 ton building at Painted Post, N. Y., with the American Bridge Company. The International Portland Cement Company, for a plant near Birmingham, is taking figures on 1000 tons. The lettings for municipal work will loom large in the immediate future, some 20,000 tons for subway work in Philadelphia coming up late next month, following some 15,600 tons for the Lavonia Avenue line of the New York transportation system, on which bids were asked for Jan. 10. The Cherry Street pier, Philadelphia, 700 tons, is to be built by the Virginia Bridge & Iron Company, and the Interborough has placed 1000 tons for substations with the American Bridge Company. Of railroad work before

fabricators, mention may be made of 500 tons for the Philadelphia & Reading; 250 tons for the Pennsylvania; 300 tons for the Baltimore & Ohio at Chicago, and 300 tons for the Norfolk & Western for a coaling station. In general building lines awards have been made as follows: Tishman apartment, East Eighty-fourth Street, 400 tons, to the Hinkle Iron Company, and a Browning apartment, 31 East Seventy-first Street, 400 tons, to Milliken Brothers, Inc. A Y. M. C. A. building at Worcester, 600 tons, is up for figures. We quote mill shipments of shapes in two to five months at 3.419c. to 3.669c., New York; at convenience of the mill 3.269c. New York, and warehouse shipments at a minimum of 3.95c., New York.

Plates and Bars.—Quite a tonnage of ship plates for foreign account on which mills have given figures have not yet been settled but a decision is expected in a few days. As regards shell steel, it appears that replies from abroad are awaited. In general, consumers are showing little interest in future commitments, although for some small lots contracts accompanied by specifications have been closed for bars at 3.25c., Pittsburgh, for shipments going into the third quarter. Almost without exception mills are unconcerned over peace talk, owing to the fact that they have many months' work against the mills in the shape of definite specifications, which are naturally regarded as not subject to cancellation. It is probable that over three-quarters of the correspondence of sales offices relates to export business, and were the mills willing to take on further commitments, particularly in ship material, they would have no difficulty in so doing. From the mill standpoint the overshadowing problem is that of transportation as regards fuel supply and the shipment of finished products. There seems no doubt that manufacturing consumers would welcome additional material, as their output is curtailed by lack of material as well as of labor. We quote universal and ordinary tank plates at 4.169c. to 5.169c., New York, but Lloyd specification plates at 5.169c. to 6.169c., with little obtainable for the fourth quarter of 1917 and beyond at 3.769c., New York. Out of store we quote 4.75c., New York, for plates under 36 in. in width and 5c. on wider plates. We quote mill shipments of steel bars at 3.169c. to 3.669c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, three months. We quote mill shipments of bar iron at 3.169c., New York. Out of warehouse iron bars are \$2 per ton higher, or 3.60c., and steel bars are 3.85c., New York.

Old Material.—Persuading unwilling buyers is the present occupation of dealers, the recent buoyant interest of consumers having completely disappeared. The market is without animation. The immediate future is not bright, important factors in the market stating that they are not looking for much improvement in the demand for at least a month. Brokers quote buying prices as follows to local dealers and consumers, per gross ton, New York:

Heavy melting steel scrap (for eastern Pennsylvania shipment).....	\$19.00 to \$19.50
Old steel rails (short lengths) or equivalent	20.00 to 20.50
Relaying rails	37.00 to 38.00
Rolling rails	27.50 to 28.00
Iron and steel car axles (for export)	43.00 to 45.00
No. 1 railroad wrought.....	25.00 to 26.00
Wrought-iron track scrap.....	21.50 to 22.00
No. 1 yard wrought, long.....	22.00 to 22.50
Light iron (nominal).....	4.50 to 5.00
Cast borings (clean).....	10.50 to 11.00
Machine shop turnings.....	9.50 to 10.00
Mixed borings and turnings (nominal)	8.00 to 8.50
Wrought pipe (not galvanized or enameled)	15.50 to 16.00

Foundries are not buying much and are making lower offers to holders. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York.

No. 1 cast.....	\$20.50 to \$21.00
No. 2 cast.....	18.00 to 18.50
Stove plate	15.00 to 15.50
Locomotive grate bars.....	15.00 to 15.50
Old carwheels	20.00 to 20.50
Malleable cast (railroad).....	18.00 to 18.50

Cast-Iron Pipe.—The city of Lynn, Mass., which had advertised for the letting of 400 tons on Jan. 6, rejected all bids, but has not announced when new proposals will be received. Private buying keeps up well, numer-

ous consumers making purchases without going through the formality of public advertising. Export inquiries are being received steadily, but manufacturers in this locality are not closing any considerable part of the current business of this character. Quotations are continued on the basis of \$41.50 per net ton, tidewater, for carload lots of 6-in., class B and heavier, with class A and gas pipe taking an extra of \$1 per ton.

British Steel Market

Ferromanganese Strong and High—Pig Iron More Active

LONDON, ENGLAND, Jan. 10, 1917. (By Cable)

The pig-iron market is more active, with a heavy forward demand for hematite iron. American billets are strong, but business is difficult. Wire rods are quoted at \$85, f.o.b. New York. Tin plates are unsettled, with the leading works taking government orders at 25s. 6d net. Ferromanganese is irregular, about £34 being asked for far forward delivery but £36 and upward for first half. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 24s. 6d.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s.
Hematite pig iron, f.o.b. Tees, 142s. 6d.
Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.
Ferromanganese, £34 to £36 and upward.
Ferrosilicon, 50 per cent. c.i.f., £29 10s. against £30 last week.

Manganese Ores Higher—American Semi-Finished Steel Difficult to Obtain

(By Mail)

LONDON, ENGLAND, Dec. 19, 1916.

The British iron and steel markets have not been affected by the recent European political news, incidental to Germany's peace overtures. The tendency continues firm from raw to finished material in spite of the approach of the year's end, and the fact that consumers' requirements in pig iron are being more successfully coped with. The pressure of steel requirements shows no abatement, this rather at the expense of those manufacturing branches which in normal times are chiefly dependent on export business, but are now badly hit by the severely curtailed supply of raw and finished steel. The more drastic export restrictions were reflected in the much reduced export returns of manufactured iron and steel for the past month.

Pig iron is more subdued because consumers have been for some time past getting good deliveries, and their needs this side of Christmas seem fully covered, while good contracts have been placed into the earlier part of the new year. More comfortable conditions now exist, in spite of occasional delays due to railroad congestion. The export demand is still lively, but there is less inclination to grant licenses both for hematite and Cleveland foundry iron. As to the former, home consumers are receiving every consideration, while the conditions elsewhere than to Allied countries have become more stringent. The position of the Midland furnace owners is stronger, the full maxima now being quoted for foundry and forge iron.

In finished iron and steel attention is now nearly entirely centered on national requirements, the extension of which seems almost unlimited, judging from the further restrictions of raw steel deliveries next month. Orders not backed up by an "A" or "B" certificate do not stand any chance of being considered, steel being hardly obtainable for merchant purposes. Business in steel and wrought iron scrap has become more lively, a feature deserving notice.

There is some difficulty in procuring American semi-finished steel, even at the recent considerable advance, though the market is widely divergent, ranging from about 82 to 90, c.i.f. Liverpool, for 4-in. billets, January-June delivery, according to port of shipment. Italy is still inquiring for good quantities, and lately

bought 5-in. billets, January-February delivery, at about \$63 f.o.b. Baltimore.

There has been more life in tin plates at a renewed advance in price, stock plates being less plentiful and more tightly held, and the premium is increasing. Working conditions are more difficult than ever, while the shortness of steel deliveries is expected to become accentuated. To protect domestic needs, export restrictions are unlikely to be relaxed. Hence the demand for American plates has increased, though there are virtually no sellers even at fancy prices.

The feature in ferromanganese has been the more active Continental demand, but makers are already sold out for next quarter. Prices vary between £35 and £38, basis f.o.b. loose, business having been done at the latter figure for Spain. The steadily increasing cost of manganese ores, due to higher freight rates, is the chief factor.

Chicago

CHICAGO, ILL., Jan. 9, 1917.

The specifying against contracts and the converting of reservations into outright purchases ran into such exceptionally large tonnages of track material, shapes, plates and bars last week as to seem to have a special import. It would appear that such hesitancy regarding the future as has been injected into the situation by the events of the past few weeks has now been dismissed and projects for the year vigorously resumed. For one of the largest interests, the week's sales and specifications broke all records, bookings of new business being at a daily rate equivalent to over 800,000 tons for the month, and of specifications at a rate equivalent to 1,000,000 tons if continued. In the week, 20,000 tons of rounds for France was placed here. The largest single order for spikes ever recorded was also booked and at the highest price. Sales of ship plates for export and further inquiry have also been a feature of the week, both in respect of prices and tonnage. For 15,000 tons of plates to be delivered in the third quarter an offer of 5.50c. at the mill has been made. Aside from the ship and car builders, domestic buyers of steel appear to have their requirements pretty well covered, and new business of size is largely from sources not ordinarily supplied from this market. Steel makers continue to report a demand for any steel they may have to sell. Among the makers of sheets, attention is being directed to the probable effect of new steel-making capacity upon the price of semi-finished materials, particularly sheet bars. Jobbers' prices on most forms of steel are up from \$3 to \$5 per ton. An active spot market for pig iron has supplanted the interest in buying for the future, but a resumption of contracting for last half is expected to develop, unless the demand for prompt iron subsides.

Pig Iron.—Buying of pig iron for the last half has not been resumed except in a scattering and unrelated fashion. The checking of interest in future requirements is still being felt, but a strong situation has been revealed in the demand for spot iron. With consumption apparently continuing unslackened, delays in the receipt of contract iron have been the occasion of inconvenience in no small degree, and filling-in purchases of iron for delivery at once have aggregated several thousand tons. Past experience suggests that melters will not long be content to neglect their future requirements if they are experiencing difficulty in meeting their current needs. Northern basic iron was sold last week at \$31 at Chicago furnace, one lot consisting of 1000 tons. For 400 tons of malleable Bessemer for first half delivery a price of \$32 at the furnace was secured. Southern iron is still to be had for either prompt or forward delivery on the basis of \$23 at Birmingham, and selling is uniformly at that price. Inquiry for standard Bessemer from abroad and from Canada involves several thousand tons, and quotations approximate \$35 at Chicago furnace. Recent advances have been made in the prices of silvery irons and Bessemer ferrosilicon. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron

delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, Nos. 2 to 5.....	\$31.75 to \$32.75
Lake Superior charcoal, No. 1.....	32.25 to 33.25
Lake Superior charcoal, No. 6 and Scotch.....	32.75 to 33.75
Northern coke foundry, No. 1.....	31.00 to 32.00
Northern coke foundry, No. 2.....	30.00 to 31.00
Northern coke foundry, No. 3.....	29.50 to 30.50
Northern high phosphorus foundry.....	27.00 to 28.00
Southern coke No. 1 f'dry and 1 soft.....	27.50 to 28.50
Southern coke No. 2 f'dry and 2 soft.....	27.00 to 27.50
Malleable Bessemer.....	31.00 to 32.00
Basic.....	31.00
Low phosphorus.....	50.00 to 55.00
Silvery, 8 per cent.....	38.50 to 39.00
Bessemer ferrosilicon, 10 per cent.....	46.50 to 47.00

Rails and Track Supplies.—The purchase of 94,000 kegs of spikes by the Southern Pacific Railroad at 3.45c., f.o.b. mill, constitutes a record transaction in the history of this market, both as regards quantity and price. The same railroad also bought 19,000 kegs of bolts at 4c., f.o.b. mill. These materials were bought for delivery in 1917, as far as possible, in which connection the increase in capacity at the Joliet mill by 7000 kegs of bolts per month, is important. Rail sales last week were in small lots, totaling about 24,000 tons. The purchase of 40,000 tons by one of the Western trunk lines is expected shortly. Quotations are as follows: Standard railroad spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4c. to 4.50c., base, all in carloads, Chicago; tie-plates, \$55 to \$60, f.o.b. mill, net ton; standard section Bessemer rails Chicago, \$38, base; open-hearth, \$40; light rails, 25 to 45 lb., \$44; 16 to 20 lb., \$45; 12 lb., \$46; 8 lb., \$47; angle bars 2.25c.

Structural Material.—Orders for plain material now being taken by the mills are almost entirely against reservations previously made for the most part by the carbuilders and shipyards. In this market there is no structural steel, not already arranged for, available for first half delivery, the situation in respect of steel in this form, being more completely limited than in any other. New transactions of importance are generally lacking and the only contract for fabricated steel reported is for coal-unloading bridges at Milwaukee calling for 400 tons. We quote for Chicago delivery of plain material from mill 3.289c. to 3.439c.

The price of structural steel out of jobbers' stock at Chicago has been advanced \$3 per ton and we quote 3.85c.

Plates.—An inquiry has been made for 15,000 tons of ship plates for third quarter delivery and this business is being offered to the mills at 5.50c. An order for 2500 tons of plates for export to the Orient was placed last week at a price only slightly below 6.50c., Chicago. The order provided for early delivery. The buying of plates of tank quality for first half delivery is limited to small quantities with prices ranging as high as 6c. where particularly early delivery is called for. For flange steel, as high as 9c. has been quoted. We quote for Chicago delivery of plates from mill, at its convenience, 3.789c.; for prompt shipment, 4.689c. to widths up to 72 in., and for wide plates, 4.939c. to 5.50c.

An advance of \$3 per ton has been announced in the price of plates from jobbers' stocks and we quote for Chicago delivery 4.50c.

Wire Products.—There is no change in the general wire situation. New contracting periods are entered into with increasing backlogs rather than a better condition of delivery, while demand, especially for barb wire and nails, may now be expected to increase through the spring buying season. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, \$3.239; wire nails, \$3.189; painted barb wire, \$3.339; galvanized barb wire, \$4.039; polished staples, \$3.339; galvanized staples, \$4.039, all Chicago.

Sheets.—Buying of sheets has perforce accommodated itself to the mill situation and requirements of a kind calling for early shipment rarely exceed 1000 tons. Recent sales of blue annealed sheets indicate that it is possible to do a little better than 4.50c., Pittsburgh, for prompt shipment, but at 4c., contracts taken by the mills for future delivery are without promise

as to date of shipment. Interest is being taken in the possibility of an easier situation in sheet bars as the result of new steel-making capacity coming into service in excess of finishing capacity in other lines than sheets. We quote, for Chicago delivery, No. 10 blue annealed, 4c. to 4.50c.; box annealed, No. 16 and lighter, 4.50c. to 5c.; No. 28 galvanized, 6.50c. to 7c. These quotations are minimum prices for contracts. Early shipment quotations are \$5 to \$10 per ton higher.

Further advances in the price of sheets have been named and we quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 4.65c.; No. 28 black, 5.15c.; No. 28 galvanized, 7.25c.

Cast-Iron Pipe.—At Cleveland, the United States Cast Iron Pipe & Foundry Company is the low bidder for 6000 tons of pipe and at Madison, Wis., the low price has been quoted by the American Cast Iron Pipe Company. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$44.50; 6-in. and larger, \$41.50, with \$1 extra for class A water pipe and gas pipe.

Old Material.—The scrap market has not yet reacted from the slump which, in the last week of December, brought a reduction of about \$2 per ton in prices. Consumers are not taking hold, although offerings of scrap, which is under necessity of being moved, are being accepted at prices named by the buyer. Purchases of shoveling steel and heavy melting scrap last week, under such conditions, were on the basis of \$18.50 for the former and \$21 for the latter. Some buying apparently is being prevented by embargoes and early replenishment of stocks by some of the rolling mills is anticipated. Except for the concessions that are being made to move scrap on track, the market exhibits a degree of firmness and among the dealers few can be found willing to sell short at current prices. Railroad listings of scrap for sale include 5000 tons by the Big Four, 1700 tons by the Wabash, 1400 tons by the Chicago Great Western, an extensive list by the Union Pacific and smaller offerings by the Vandalia and Pere Marquette. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails.....	\$27.00 to \$28.00
Relaying rails.....	30.00 to 31.00
Old carwheels.....	19.00 to 20.00
Old steel rails, rerolling.....	27.00 to 28.00
Old steel rails, less than 3 ft.....	25.00 to 26.00
Heavy melting steel scrap.....	21.00 to 22.00
Frogs, switches and guards, cut apart.....	21.50 to 22.00
Shoveling steel.....	18.00 to 19.00
Steel axle turnings.....	14.00 to 14.50

Per Net Ton	
Iron angles and splice bars.....	\$27.50 to \$28.00
Iron arch bars and transoms.....	28.00 to 29.00
Steel angle bars.....	20.50 to 21.00
Iron car axles.....	36.00 to 37.00
Steel car axles.....	40.00 to 41.00
No. 1 railroad wrought.....	23.50 to 24.00
No. 2 railroad wrought.....	22.50 to 23.00
Cut forge.....	22.00 to 22.50
Pipes and flues.....	14.00 to 14.50
No. 1 busheling.....	17.00 to 17.50
No. 2 busheling.....	12.75 to 13.25
Steel knuckles and couplers.....	22.50 to 23.00
Steel springs.....	22.50 to 24.00
No. 1 boilers, cut to sheets and rings.....	13.00 to 13.50
Boiler punchings.....	18.50 to 19.00
Locomotive tires, smooth.....	23.00 to 23.50
Machine-shop turnings.....	9.50 to 10.00
Cast borings.....	9.00 to 9.50
No. 1 cast scrap.....	15.50 to 16.50
Stove plate and light cast scrap.....	12.50 to 13.00
Grate bars.....	13.50 to 14.00
Brake shoes.....	13.50 to 14.00
Railroad malleable.....	18.00 to 18.50
Agricultural malleable.....	15.00 to 15.50

Bars.—The buying of implement bars for the last half of the year is not likely to be provided for in the usual manner of spring contracting because of the abnormal delivery conditions existing. It is certain that few, if any, mills furnishing implement bars could supply steel, not already contracted for or reserved, and it is safe to assume that the implement interests are already covered for such material as they will need throughout 1917. Sales of iron bars and of rail carbon steel bars are limited to such lots as the mills are desirous of taking, from time to time, to balance their rolling operations. Sales last week were at 3c. We quote mill shipment, Chicago, as follows: Bar iron, 3c. to 3.25c.; soft steel bars, 3.189c. to 3.439c.; hard steel

bars, 3c. to 3.25c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: Soft steel bars, 3.75c.; bar iron, 3.75c.; reinforcing bars, 3.75c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 1st plus 5 per cent.

Rivets and Bolts.—There is little selling as yet at the recent advance in prices, but such manufacturers as are in a position to take orders report no difficulty in securing all the business they desire on the basis of prices which preceded the last advance. We quote as follows: Carriage bolts up to $\frac{3}{8}$ x 6 in., rolled thread, 40-10; cut thread, 40-2 $\frac{1}{2}$; larger sizes, 30-5; machine bolts up to $\frac{3}{8}$ x 4 in., rolled thread, with hot pressed square nuts, 50; cut thread, 40-10; large size, 35-5; gimlet-point coach screws, 50; hot pressed nuts, square, \$2.50 off per 100 lb.; hexagon, \$2.60 off. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c.; boiler rivets, 4.60c.; machine bolts up to $\frac{3}{8}$ x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to $\frac{3}{8}$ x 6 in., 40-2 $\frac{1}{2}$; larger sizes, 30-5; hot pressed nuts, square, \$3., and hexagon, \$3 off per 100 lb.; lag screws, 50.

Bonuses and Wage Advances

The Novo Engine Company, Lansing, Mich., will pay March 1 to those still in its employ its second annual wage dividend covering the year 1916. All employees who have been continuously in the company's employ for the year 1916 will receive an amount equal to 5 per cent on their total wages earned in the 12 months ended Dec. 31 at their regular rate per day. To those who have been in its employ continuously for six months but less than 12 months, the amount paid is equal to 2 $\frac{1}{2}$ per cent.

The Prescott Company, Menominee, Mich., has announced that, beginning Jan. 1, it will pay a bonus of 25 cents a day to its 200 employees for an indefinite period. This bonus is for each full day or night worked in accordance with the shop schedule of hours. The notice to employees says: "Failure to work the full schedule of hours on any day or night will forfeit the bonus for that particular day or night. This means that no part of the bonus will be paid to any operative who works less than 10 hr. on any week day and 5 hr. on Saturday, or 12 hr. on any night."

The Midvale Steel & Ordnance Company will soon offer to employees \$50 par value stock at \$60 a share. Under certain conditions the company will guarantee an income of not less than \$6 a share annually for five years.

Employees of the Stambaugh-Thompson Hardware Company, Youngstown, Ohio, will share in a profit distribution, of which the details are to be announced shortly. The amount paid is to be based on the net earnings of the company and the employees will share in proportion to their salaries.

The Wheeling Steel Casting Company, whose plant is at Harwood, near Wheeling, W. Va., has given its employees a voluntary advance in wages of 10 per cent, effective from Jan. 1.

Employees of the Vogt Brothers Mfg. Company, Louisville, Ky., were presented with an extra day's pay as a Christmas remembrance.

The B. F. Avery & Sons Company, Louisville, Ky., manufacturing plows and implements, paid its employees a cash bonus of 5 per cent on wages for the preceding six months.

Nearly 6000 persons including employees, their relatives and friends, attended the second annual Christmas party held in the main hall of the Milwaukee Auditorium, Dec. 22, under the auspices of the Cutler-Hammer Mfg. Company. There was a distribution of gifts to the 1200 children present and on the same day each employee was given a cash Christmas gift and the day's work stopped at 4 o'clock. The affair was in charge of the employees' committee.

Iron and Industrial Stocks

NEW YORK, Jan. 10, 1917.

While the stock market in general has not recovered from the severe slump caused by Germany's peace overture, some of the stocks of companies known to be doing an exceedingly profitable business have made quite sharp recoveries. Conspicuous among these has been Steel Corporation common. On some days of the past week this stock was particularly strong. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	27 - 29	Harb-Walk. Refrac.	
Allis-Chal., pref.	84 $\frac{1}{2}$ - 85 $\frac{1}{2}$	pref.	108 $\frac{1}{2}$ - 110
Am. Can. com.	46 $\frac{1}{4}$ - 51	Int. Har. of N. J.,	
Am. Can. pref.	109 - 110	com.	121 - 122
Am. Car & Fdy.,		Int. Harv. of N. J.,	
com.	65 $\frac{1}{2}$ - 69 $\frac{1}{2}$	pref.	118 - 120 $\frac{1}{2}$
Am. Car & Fdy.,		Int. Har. Corp.,	
pref.	116 $\frac{1}{4}$ - 117	com.	83 $\frac{1}{2}$
Am. Loco., com.	75 $\frac{1}{2}$ - 82 $\frac{3}{4}$	La. Belle Iron,	
Am. Loco., pref.	104 $\frac{1}{2}$ - 106 $\frac{1}{4}$	com.	80 - 82 $\frac{3}{4}$
Am. Rad., pref.	135	Lacka. Steel	84 - 89 $\frac{1}{4}$
Am. Ship. com.	65 - 67	Lake Sup. Corp.,	19 - 21 $\frac{1}{2}$
Am. Ship. pref.	94 - 95	Midvale Steel,	61 $\frac{1}{2}$ - 65 $\frac{1}{2}$
Am. Steel Fdries.	59 - 63	Nat. En. & Stm.,	
Bald. Loco., com.	53 $\frac{1}{2}$ - 62	com.	27 - 29 $\frac{3}{4}$
Bald. Loco., pref.	101 $\frac{1}{2}$	N. Y. Air Brake,	142 - 150
Beth. Steel, com.	495 - 515	Nova Scotia Stl.,	111 - 125
Beth. Steel, pref.	135	Pitts. Steel, pref.	102
Cambria Steel,	120 - 125	Pressed Stl., com.	74 $\frac{1}{2}$ - 78
Carbon Stl., com.	100 - 109	Pressed Stl., pref.	106
Central Fdry.,		Ry. Steel Spring,	
com.	23 - 26	com.	49 $\frac{1}{2}$ - 52 $\frac{1}{2}$
Central Fdry.,		Ry. Steel Spring,	
pref.	40 - 41	pref.	100
Chic. Pneu. Tool.	70 - 72 $\frac{1}{2}$	Republic, com.	78 $\frac{1}{4}$ - 83 $\frac{3}{4}$
Colo. Fuel,	44 $\frac{1}{4}$ - 48 $\frac{1}{2}$	Republic, pref.	102 $\frac{1}{2}$ - 103 $\frac{3}{4}$
Cruc. Steel, com.	61 $\frac{3}{4}$ - 68 $\frac{3}{4}$	Sloss, com.	66 - 71
Cruc. Steel, pref.	115 - 117 $\frac{1}{4}$	Un. Alloy Steel,	48 - 51
Deere & Co., pref.	98 $\frac{1}{4}$ - 99	U. S. Pipe, com.	21 - 23 $\frac{1}{4}$
Driggs-Seabury	55 - 56	U. S. Pipe, pref.	61 - 62
Gen. Electric,	166 $\frac{1}{2}$ - 169 $\frac{1}{2}$	U. S. Steel, com.	109 $\frac{1}{2}$ - 115 $\frac{1}{2}$
Gt. No. Ore Cert.	35 $\frac{1}{2}$ - 37 $\frac{1}{2}$	U. S. Steel, pref.	119 $\frac{1}{2}$ - 120 $\frac{1}{2}$
Gulf States Steel	127 - 137	Va. I. C. & Coke,	50 $\frac{1}{2}$ - 54 $\frac{1}{2}$
Harb-Walk. Refrac.		Warwick	9 $\frac{1}{2}$ - 9 $\frac{3}{4}$
com.	123 - 125	Westing. Elec.	52 $\frac{1}{4}$ - 54 $\frac{3}{4}$

Dividends

The Sloss-Sheffield Steel & Iron Company, quarterly, 1 $\frac{1}{2}$ per cent on the common stock, payable Feb. 1. This puts the common on a 6 per cent basis.

The Willys-Overland Company, quarterly, 75 cents per share on the common stock, payable Feb. 1.

The Pittsburgh Coal Company, regular quarterly, 1 $\frac{1}{2}$ per cent on the preferred stock, payable Jan. 25.

The Harbison-Walker Refractories Company, regular quarterly, 1 $\frac{1}{2}$ per cent on the preferred stock, payable Jan. 20.

The Midvale Steel & Ordnance Company, initial quarterly, \$1.50 per share, payable Feb. 1.

The Cleveland-Cliffs Iron Company, stock dividend of 35 per cent on the present outstanding capitalization, which calls for the distribution of \$2,580,000 in new shares, and a quarterly cash dividend of 2 $\frac{1}{2}$ per cent, amounting to \$170,000. A year ago the company distributed a 50 per cent stock dividend.

The Standard Screw Products Company, Detroit, declared 50 per cent stock dividend to all stockholders of record on Jan. 1, in addition to the regular monthly 1 per cent cash dividend. This company recently paid an extra cash dividend of 50 per cent. The capital has been increased from \$100,000 to \$250,000.

In a letter to Port Agent Frank A. Page, Providence, R. I., Wallace Downey, principal owner of the Providence Engineering Corporation, which recently purchased the Providence Engineering Works, explains that the works were bought as the first unit of a complete shipbuilding plant. The company will also construct a hull-building yard and on the completion of this work will begin building a group of standardized cargo-carrying vessels. The location of the shipbuilding plant has not been announced.

The Pulsometer Steam Pump Company, Irvington, N. J., announces that a branch office has been opened in Detroit by its Western distributor, the May & Talley Company. The office will be located on the fourth floor of the Penobscot Building, and will be under the management of John Cavan.

A. C. Leslie & Co., Ltd., Montreal, Canada, announces the completion of 50 years in business, having started in 1866. Present officers of the company are as follows: President, William S. Leslie; vice-president, Thomas H. Jordan; director and secretary, Edward H. Copland.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

Jan.	Copper, New York		Tin, New York	Lead		Spelter	
	Lake	Electro-lytic		New York	St. Louis	New York	St. Louis
3.....	29.00	29.00	43.00	7.50	7.32½	9.75	9.50
4.....	28.50	28.50	42.50	7.50	7.32½	9.75	9.50
5.....	28.25	28.25	42.50	7.50	7.32½	9.62½	9.37½
6.....	28.00	28.00	7.50	7.32½	9.62½	9.37½
8.....	28.00	28.00	42.75	7.50	7.32½	9.62½	9.37½
9.....	27.75	27.75	42.50	7.50	7.32½	9.50	9.25

NEW YORK, Jan. 10, 1917.

Resale copper has continued to decline, but offerings are fewer, and the market is taking on a nominal aspect. On one or two days tin has been active with the business confined to a few hands on both sides. Lead is dull and unchanged as to price. Spelter is lower, following what appears to have been an effort to depress the market. Antimony is quiet and easy.

New York

Copper.—Under the pressure to dispose of resale metal, a part of which has been offered by consumers, mostly in carload lots, prices have dropped to a point which makes selling no longer attractive, and the market is taking on a nominal aspect. Yesterday prompt electrolytic could have been had, if the right seller were found, at 27.75c. to 28c., first quarter at 27c. to 27.50c., and second quarter around 26c. Prices, however, showed a great variance. Lake is at about the same levels. Only theories are forthcoming as to the reasons underlying the break in the market. One certain thing is that the recent peace talk had an adverse effect which has not yet disappeared. A theory, which is held by more than one person, is that some of the resale metal may be coming from representatives of the Central Powers who are known to have purchased copper at from 18c. to 20c., long before the Entente allies became active as buyers. The producers who have little or no copper to offer for the first half are doing no business at all, and their position, so far as last half is concerned, is hardly a comfortable one. For them to make quotations for the third and fourth quarters proportionate to the prices quoted for prompt delivery by second hands would be a confession of weakness which they have not been willing to admit. The trade is wondering if some of the metal purchased by Great Britain will be diverted to munitions use in this country instead of being exported in unmanufactured form. The London quotation for spot electrolytic yesterday was £143, against £145 the week previous. The exports this month, including yesterday, totaled 6162 tons.

Tin.—Except on Jan. 4 and yesterday, the market has been dull and uninteresting. On the first day referred to probably 300 tons was taken, a part of which was for May and June delivery at 41.12½c. The market then lapsed into dullness again, and buyers could not be tempted despite fairly low offers. Yesterday another 300 tons changed hands. All of the sales have involved only a few buyers and sellers. The tin plate manufacturers are covered, having bought heavily some time ago. The tin brokers find it difficult to get specific information about tin shipments from the other side, the agents of the lines here often flatly refusing to tell them when certain ships will sail or arrive. The quotation for spot tin yesterday was 42.50c. The arrivals this month total 1520 tons, and there is afloat 4333 tons.

Lead.—This metal has been dull and without feature. The New York price is unchanged at 7.50c., while the St. Louis market is a trifle easier at 7.32½c. The trade has been speculating on the probable effect of the estimated production of 1916, which showed an increase of 51,174 tons. The increased production is something that certainly must be reckoned with after the war, and possibly before it ends. So far, however, the figures have had but little influence. The London quotation yesterday was £30 10s., unchanged as compared with a

week ago. The exports this month, including yesterday, amount to only 305 tons.

Spelter.—On Monday an offering of January, February and March spelter was made on the floor of the New York Metal Exchange at 9.25c., St. Louis, for January, 9c. for February and 8.75c. for March. At the time there was no sale, and the offering at these prices was criticised as not being bona fide. Yesterday, however, the offer was repeated and the metal was disposed of at the prices mentioned, and more could have been had at the same levels. At present there appears to be but little outlook for a stronger or much more active market, although it is hoped that Great Britain will soon buy, inasmuch as she is not believed to have made purchases of spelter in proportion to her buying of copper. The brass trade is not buying. A theory that has been put forth in two or three directions is that German interests are so confident of a near termination of the war that they are desirous of selling and taking what profit they can, possibly avoiding losses. The estimated production figures of the United States Geological Survey, indicating a production of 672,300 tons in 1916, against 492,495 tons in 1915, has not helped the situation. The London quotation for spot yesterday was £50 5s., which is the same as the week previous. The exports this month, including yesterday, total 1013 tons.

Antimony.—The market has been continuously dull and spot, duty paid, antimony is easily obtainable at 14.25c., and possibly a shade lower.

Aluminum.—Offerings by second hands have eased the market and No. 1 virgin aluminum is obtainable at 59c. to 62c.

Old Metals.—The market is quiet. Dealers' selling prices are lower on most commodities, and are now as follows:

	Cents per lb.
Copper, heavy and crucible.....	28.50 to 29.50
Copper, heavy and wire.....	27.00 to 28.00
Copper, light and bottoms.....	24.00 to 25.00
Brass, heavy.....	16.50 to 17.00
Brass, light.....	12.00 to 13.00
Heavy machine composition.....	23.00 to 23.50
No. 1 yellow rod brass turnings.....	17.50 to 18.50
No. 1 red brass or composition turnings.....	17.00 to 19.00
Lead, heavy.....	6.75
Lead, tea.....	6.25
Zinc.....	7.00 to 8.00

Chicago

JAN. 8.—Quotations appear to be current for copper that indicates considerably lower prices than can be done on actual purchases, and there is a disposition to exaggerate the softness of the market. Tin has been holding firmly and is quotably higher. Prices of scrap metals have slumped sharply. We quote: Casting copper, 28.75c.; Lake copper, 30c.; tin, carloads, 43.25c., and small lots, 44.50c.; lead, 7.50c.; spelter, 9.50c. to 9.75c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 16.50c. to 17c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 21c.; copper bottoms, 19c.; copper clips, 20c.; red brass, 19c.; yellow brass, 14c.; lead pipe, 5.50c.; zinc, 5.50c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 35c.

St. Louis

JAN. 8.—Non-ferrous metals have been quiet, with the close to-day, carload lots, at, spelter, 9.50c. to 9.75c.; lead, 7.50c. to 7.75c.; less than carload lots, lead, 7.65c. to 7.90c.; spelter, 10.50c.; tin, 46½c.; Lake copper, 30c.; electrolytic copper, 29.50c.; Asiatic antimony, 16.50c. In the Joplin ore district the market was dull with the top price of zinc blende \$80 per ton for 60 per cent metal, and lead ore firm at \$90 for 80 per cent. Calamine was steady at \$45 to \$50. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10.50c.; heavy yellow brass, 14c.; heavy red brass and light copper, 19c.; heavy copper and copper wire, 22c.; pewter, 25c.; tinfoil, 34c.; zinc, 6c.; lead, 5c.; tea lead, 4.50c.

Tin exports from the Federated Malay States in November, 1916, were 3635 tons, against 4059 tons and 4085 tons in November 1915 and 1914 respectively.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 3c. to 3.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3.60c. to 5c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered ¼ in.	
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft. inclusive	.55
Circles under 2 ft., to 1 ft. inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, \$75 to \$80.

Wire Products.—Prices to jobbers effective Nov. 27: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.95; galvanized, \$3.65. Galvanized barb wire and

staples, \$3.85; painted, \$3.15. Wire nails, \$3. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.90. Woven wire fencing, 53 per cent off list for carloads, 52 off for 1000-rod lots, 51 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Dec. 29, 1916, all full weight:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1½, 2 and 3	57	30½	1½ and 2	46	19
3½ to 4	61	46½	2½	47	20
4½ to 5	64	50½	3½	51	33
			4½ to 5½	54	40
Lap Weld			Butt Weld		
2	57	44½	1½	40	25
2½ to 3	60	47½	2	46	32
3 to 4	57	43½	2½	47	33
4 to 5	47½		3	49	36
5 to 6	45		3½ to 4	49	36
			4½ to 5	49	36
			5 to 6	48	35
Reamed and Drifted			Butt Weld, extra strong, plain ends		
1 to 3, butt	62	48½	1½ to 2½, butt	49	32
2, lap	55	42½	2½, lap	35	19
2½ to 3, lap	58	45½	1½, lap	41	26
			2, lap	42	27
			2½ to 4, lap	45	30
Lap Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
1½, 2 and 3	53	35½	1½, 2 and 3	46	29
3½ to 4	58	45½	2½	51	38
4½ to 5	62	49½	3½ to 4½	55	40
5 to 6	63	50½			
Lap Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
2	55	43½	1½	42	27
2½ to 4	58	46½	2	47	33
4½ to 6	57	45½	2½	49	36
7 to 8	53	39½	3	51	39
9 to 12	48	34½	4½ to 6	50	38
			7 to 8	44	32
			9 to 12	39	27

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

Boiler Tubes.—Discounts on less than carloads, freight to be added, effective from Nov. 1, 1916, except 3 to 4½ in. steel from Nov. 20, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1½ in.	31
1½ and 2 in.	43
2½ in.	40
2½ and 3 in.	46
3 and 3½ in.	46
3½ to 4½ in.	46
5 and 6 in.	45
7 to 13 in.	42
1½ in.	31
1½ and 2 in.	35
2½ in.	32
2½ and 3 in.	38
3 and 3½ in.	43
3½ to 4½ in.	44
5 and 6 in.	37
7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1½ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

Nos.	Cents per lb.
Nos. 3 to 8	4.00 to 4.25
Nos. 9 to 12	3.75 to 4.00
Nos. 13 to 16	3.85 to 4.10
Nos. 5 and 16	5.50 to 6.00
No. 17 and lighter gages are based on \$4.50 per 100 lb. for No. 28 Bessemer black sheets.	

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	4.30 to 4.55
Nos. 22 and 24	4.35 to 4.45
Nos. 25 and 26	4.40 to 4.65
No. 27	4.45 to 4.70
No. 28	4.50 to 4.75
No. 29	4.55 to 4.80
No. 30	4.65 to 4.90

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	5.25 to 5.75
Nos. 12 to 14	5.35 to 5.85
Nos. 15 and 16	5.50 to 6.00
Nos. 17 to 21	5.65 to 6.15
Nos. 22 and 24	5.80 to 6.30
Nos. 25 and 26	5.95 to 6.45
No. 27	6.00 to 6.50
No. 28	6.25 to 6.75
No. 29	6.40 to 6.90
No. 30	6.55 to 7.05

Tin Mill Black Plate

Nos. 15 and 16	4.05 to 4.20
Nos. 17 to 21	4.10 to 4.25
Nos. 22 to 24	4.15 to 4.30
Nos. 25 to 27	4.20 to 4.35
No. 28	4.25 to 4.40
No. 29	4.30 to 4.45
No. 30	4.35 to 4.45
Nos. 30½ and 31	4.35 to 4.50

PERSONAL

James E. Strong succeeds the late Jones G. Moore as general superintendent of mines of the Sloss-Sheffield Steel & Iron Company. Mr. Strong leaves a similar position held by him with the Gulf States Steel Company. He is a native of Great Britain, but has been in Alabama since 1884.

Charles C. Ramsey, president Crucible Steel Company of America, is seriously ill in a hospital in Pittsburgh. He was seized with pneumonia some weeks ago and complications have set in which it is feared may prove fatal.

Arthur Aigeltinger has been elected president of the Manganese Steel Rail Company, 30 Church Street, New York, succeeding W. G. Pearce, who was elected chairman of the board.

W. A. Folger, manager of the Pacific Tool & Supply Company, San Francisco, is preparing to make a trip to machine-tool manufacturing centers this month.

Y. Fukushima, vice-president Osaka Iron Works, Osaka, Japan, is in San Francisco making shipping arrangements for large quantities of steel and machinery recently ordered in the east.

Gilbert L. Robinson, formerly connected with the sales departments of the Carnegie Steel Company and Pittsburgh Steel Company, Pittsburgh, and since last April as assistant manager of the steel department of Gaston, Williams & Wigmore, Inc., 140 Broadway, New York City, will sail Jan. 13 for an extended business trip to Europe, visiting the company's offices at Rome, Madrid and Paris.

Charles H. Eib, formerly assistant manager of sales, Republic Iron & Steel Company, Chicago, has been appointed manager of sales for that office, succeeding Dwight S. Guthrie, who has resigned to become associated with the Federal Export Company, New York.

Henry Meyers, formerly with the Hamilton Machine Tool Company, Hamilton, Ohio, has joined the sales force of the Cullen Machinery Company, Cleveland, Ohio.

The Vogt Bros. Mfg. Company, Louisville, Ky., incorporated six months ago to engage in the manufacture of ice-making and pumping machinery, has elected officers as follows: President, Adam Vogt; vice-president and general manager, C. W. Vogt; secretary and treasurer, Ernest L. Vogt; chief engineer, Eric H. Peterson; superintendent, Dan T. Gray; sales manager, F. A. Greenlee.

J. W. Phillips, formerly of Edgar Allen & Co., is now associated as general manager with the Century Steel Company of America, 120 Broadway, New York.

Prof. Frank W. Taussig, of Harvard University, has accepted a place on the Tariff Commission and probably will be made chairman. He is a teacher of political economy and has written extensively on the tariff.

A. C. Morse, who has been general manager of the Ohio Seamless Tube Company, Shelby, Ohio, since its organization, has been elected to the presidency, which office has been vacant since the death of G. M. Skiles. Mr. Morse will continue to serve as general manager. Other officers elected at the recent annual meeting are E. W. Wiggins, chairman of the board; R. C. Skiles, vice-president; Henry Brubaker, assistant general manager and superintendent; J. A. Brubaker, secretary and treasurer, and George Reichert, assistant secretary and treasurer.

Dwight S. Guthrie, for several years manager of sales in the Chicago office of the Republic Iron & Steel Company, going there from the Cleveland office, is now associated with the Federal Export Corporation, 111 Broadway, New York, and will have charge of its steel department. The business of the latter company is fast growing, important orders having been taken of late for iron and steel products, including railroad material.

L. A. Zurcher, engineer for Germano Boettcher, a Brazilian house which is the agent for the American Steel Export Company, New York, sailed for Rio de Janeiro, Dec. 30.

Walter E. Meub, formerly chief clerk in the accounting department, has been made secretary to James A. Campbell, president Youngstown Sheet & Tube Company, Youngstown, Ohio. This is a newly created position, the appointment becoming effective Feb. 1.

Col. H. P. Bope, vice-president and general manager of sales, Carnegie Steel Company, Pittsburgh, has been elected president of the Americus Club of that city. W. C. Reitz, Pittsburgh Steel Products Company, was elected treasurer of the same organization.

A. A. Frazee, for several years with the Pittsburgh offices of Shimer & Co., of Philadelphia, has resigned and is now connected with the sales department of the Pittsburgh office of the Reliance Iron & Coke Company, Frick Building.

H. A. Runge, one of the vice-presidents of the International Commercial Corporation, New York City, resigned on Jan. 1.

Peter Nordstrom, erecting engineer, Bucyrus Company, South Milwaukee, Wis., has returned from a three months' sojourn in the iron-ore district of northern Sweden. He superintended the installation of 16 electric Bucyrus shovels in the Kiruna mine of the Grangesberg Company, one of the largest and most valuable ore deposits in the world. The mine was opened in 1899 and up to this time 10,000,000 tons of ore have been taken out. With the new Bucyrus shovel equipment, it is expected to bring its annual ore movement to 3,000,000 or 4,000,000 tons under favorable transportation conditions, such as the cessation of hostilities in Europe would furnish.

Louis Williams, general superintendent of the Superior, Wis., yards of the American Shipbuilding Company since 1890, resigned Jan. 1 to take a rest. He is succeeded by John W. Sinclair, Duluth, Minn., who has been in charge of repair work.

Andrew Banse, general superintendent of the Federal Pressed Steel Company, Milwaukee, has been given four months' leave of absence, and left Jan. 6 with his family on an extended tour of the South and West. The employees presented him with a gold watch.

Edwin E. Witte has been elected secretary of the Industrial Commission of Wisconsin to fill the vacancy caused by the resignation of Paul Jerome Watrous, who has become associated with Lord & Thomas, Chicago. Mr. Witte was graduated from the University of Wisconsin in 1909. He did special work for the commission during the summer of 1916.

Charles J. Ramsburg, vice-president of the H. Koppers Company, is to address a joint meeting of the American Society of Mechanical Engineers and the Franklin Institute in Philadelphia on Jan. 23, on "The By-Product Coking Industry."

H. H. Gildner, who has been for the last three years chief engineer of the S. K. F. Ball Bearing Company, Hartford, Conn., has joined F. R. Blair & Company, Inc., 50 Church Street, New York, as manager of the department of Flexite universal joints and couplings.

Arthur V. Farr, for the past three years advertising manager of the S. K. F. Ball Bearing Company, Hartford, Conn., has resigned to become sales manager of the Hess Steel Corporation, Baltimore, Md.

Frank H. Dodge became associated on Jan. 1 with the Werner G. Smith Company, Cleveland, Ohio, manufacturer of the Linoil line of core oils, as resident manager for Michigan and part of Ohio. He has a wide acquaintance among foundries in the Middle West, having been resident manager for the past seven years in the Cleveland territory for the S. Obermayer Company.

C. A. Barnes, who has been engaged in the old material trade for about twenty years, and has for some years been general manager for Luria Brothers & Co., Reading, Pa., has embarked in business for himself under the style of C. A. Barnes & Co., with offices in 509-511 Widener Building, Philadelphia.

William A. Field, general superintendent of South works, Illinois Steel Company, has resigned to become general manager of the United Alloy Steel Corporation, Canton, Ohio. He will be succeeded at South Chicago by Peter A. Newton, who has been for a number of years assistant superintendent. Mr. Field has been in charge of the South works for 13 years, and has worked through the various departments of the mill prior to that time.

Eustace McKee, formerly with the Snyder Furnace Company, has been appointed superintendent of the Electric Steel Company, Chicago. This company is now operating a 3000-lb. Snyder furnace and will install another unit of 3 tons capacity.

Frank H. Parker, assistant to the general superintendent of the Republic Iron & Steel Company, Chicago, has resigned to become associated with Briggs & Turiyas, Chicago, dealers in scrap.

George E. Harris, for 27 years connected with the Edgar Thomson works of the Carnegie Steel Company, and for 19 years a member of the Borough Council of Braddock, Pa., has resigned both positions. He was presented with a gold watch, chain and Masonic charm in behalf of 30 departmental heads of the Edgar Thomson works, also with a silver service of 123 pieces by the foremen, clerks and other employees of the four finishing mills. He will make his home in the future in New Bloomfield, Perry County, Pa.

George H. Court, who was formerly connected with Topping Brothers, heavy hardware merchants, 122 Chambers Street, New York City, but for the past 10 years has been the export sales representative of the American Iron & Steel Mfg. Company, has resigned from the latter connection to rejoin Topping Brothers in the capacity of sales manager, effective Jan. 1.

A. R. Giffin has been appointed production and factory manager for the Kellogg Mfg. Company, manufacturer of air pumps and automobile accessories, Rochester, N. Y. He was formerly with the Timken interests at Detroit.

Announcement is made of the appointment of D. Antony Usina, 44 Burnett Place, Nutley, N. J., as head patent attorney for the United States Steel Corporation, succeeding the late Charles C. Linthicum.

Paul H. Metzler, for the past fifteen years connected with the Crucible Steel Company of America, Harrison, N. J., at the West Bergen plant, and lately assistant manufacturing manager, has resigned.

L. M. Wainwright, president Diamond Chain & Mfg. Company, Indianapolis, has been appointed vice-chairman of the newly-constituted Indianapolis section of the American Society of Mechanical Engineers.

Major William H. Wiley, John Wiley & Sons, New York; F. H. Clark, general superintendent of motor power, Baltimore & Ohio Railroad, Baltimore, and C. C. Thomas, professor of mechanical engineering, Johns Hopkins University, Baltimore, have been appointed honorary vice-presidents to represent the American Society of Mechanical Engineers at the Congress of Constructive Patriotism of the National Security League to be held in Washington, Jan. 25, 26 and 27.

Prof. M. E. Cooley, dean of the department of engineering, University of Michigan, Ann Arbor; E. C. Fisher, general manager Wickes Boiler Company, Saginaw, Mich.; T. H. Hinchman, Smith, Hinchman & Grylls, consulting engineers, Detroit; G. W. Bissell, professor mechanical engineering, Michigan Agricultural College, East Lansing, and J. W. Parker, Edison Illuminating Company, Detroit, have been appointed an executive committee of the Detroit section of the American Society of Mechanical Engineers.

Paul R. Clark, sales manager of the General Fireproofing Company, Youngstown, Ohio, has resigned to become sales manager of its New York agent, the Fireproof Products Company. He was presented with a gold watch and chain by office associates. He has been succeeded by William B. Turner, formerly advertising manager of the General Fireproofing Company.

Edward Ehlers, president Rockaway Rolling Mill, Rockaway, N. J., on Jan. 3 was elected a director and president of the First National Bank of Rockaway.

M. H. Maury has been appointed manager of furnaces and iron mines of the Virginia Iron, Coal & Coke Company, with office at Roanoke, Va.

W. A. Haven, assistant manager of blast furnaces in the Youngstown district of the Republic Iron & Steel Company, resigned, effective Jan. 1, and has been made general superintendent of the Midland furnace of the Pittsburgh Crucible Steel Company, Midland, Pa.

F. C. Bryant, C. I. Lloyd and E. A. Whiting, young mechanical engineers who also have had practical shop training, sailed for Europe Jan. 6 to join the Paris force of the Allied Machinery Company of America.

Effective Jan. 1, Henry J. Sage, former Pittsburgh district manager of the Crocker-Wheeler Company, was made district manager of the Boston offices of the Kerr Turbine Company located at 79 Milk Street. His successor at Pittsburgh is J. R. Lewis. Roger G. Miller, former district manager of the Westinghouse Machine Company in Philadelphia, has been made district manager of the Philadelphia offices of the Kerr Turbine Company located in room 1216 of the Stock Exchange Building.

The W. & S. Mfg. Company, manufacturer of metal stampings, dies, etc., Worcester, Mass., has elected Harry R. Sinclair, president; Frank E. Billings, treasurer, and B. M. Whittle, clerk. This company is the outgrowth of the former Wilson & Smith organization of which H. R. Sinclair became sole owner in 1910.

Edward F. Fitch, for the past 18 years assistant purchasing agent of the American Radiator Company, Chicago, has resigned to become treasurer and general manager of the Imperial Belting Company, Chicago.

Industrial Conservation Meeting for New England

An all-day meeting, arranged by the Employers' Association of Worcester County and the Worcester Branch, National Metal Trades Association, will be held Jan. 19 at the Bancroft Hotel, Worcester, Mass. It will be an industrial preparedness meeting with the general topic of industrial conservation. It is expected that representatives of the employers', manufacturers', and metal trades associations of every New England city will be present.

At the morning session, presided over by John W. Harrington, president of the Employers' Association of Worcester County, the speakers will be E. P. Cornell, Boston, on "The Value of the Moving Picture in Industry," and Magnus W. Alexander, Lynn, general manager of the National Industrial Conservation Board, on "The Value of Safety and Sanitation Work in Factories."

There will be three conferences in the afternoon. The first, presided over by Herbert E. Jennison, president of the Fitchburg Manufacturers' Association, will discuss "Why We Stand for the Open Shop." The presiding officer at the second conference will be J. H. Drury, Union Twist Drill Company, Athol, and the topic will be "How Can We Maintain the Present Payroll After the War Without a Protective Tariff?" Charles E. Hildreth, general manager of the National Machine Tool Builders' Association, will preside over the third conference of which the subject is, "Employer, Employee and Citizen Co-operating for the Community's Well-being."

At the dinner in the evening the general subject will be "What Employers Receive from the Legislative Mill?" and Jerome R. George, president of the Worcester Branch, National Metal Trades Association, will preside. The first speaker will be W. H. Van Dervoort, East Moline, Ill., president of the National Metal Trades Association. James A. Emery, Washington, D. C., will follow.

Increased Output of Norwegian Ferrosilicon

The electrochemical works at Hafslund, Norway, has considerably increased its output of ferrosilicon. The Hafslund Power Company, which owns the waterfalls and supplies the current, has now become a purely Norwegian concern, as all the shares, formerly held by the German Schückert firm and representing three-fourths of the share capital, have been acquired by Norwegians.

OBITUARY

JAMES B. BAIRD, prominent in the iron and steel industry for many years, died at Cincinnati, Ohio, Jan. 2, of pneumonia, aged 51 years. His first position of prominence was manager of the Elwood Iron Works, Elwood, Ind., in the manufacture of tinning machinery. While in charge of this plant he invented and developed devices still used in the manufacture of tin plate. He then became manager of the Cincinnati Rolling Mill, making tin plate, until it was taken over by the American Sheet & Tin Plate Company, the plant being dismantled some time afterward. He next became interested in a tin mill at Chester, W. Va., which was also bought by the American Sheet & Tin Plate Company and is still being operated. He was one of the organizers of the American Rolling Mill Company, Middletown, Ohio, and at the time of his death was a stockholder. He was president and general manager of the Canton Roll & Machine Company, Canton, Ohio, until this plant was taken over by the American Sheet & Tin Plate Company. He organized and built the plant of the American Roll & Foundry Company, Canton, Ohio, and was its first president and general manager. Selling his interest in that company, he took over the old West Penn Foundry, Avonmore, Pa., which had been idle for some time, reorganized it as the National Roll & Foundry Company, and became its president and general manager, serving as such up to the time of his death. Among the most notable of his patented improvements are the Baird water-cooled sheet-mill standing and the Baird automatic roll-scouring device.

ANDY BRANN, senior member of Brann & Stuart, engineers and contractors, with offices in the Commercial Trust Building, died suddenly Dec. 30 at his residence in Philadelphia, aged 67 years. He was born in Ohio, took up the profession of bridge building as a young man and achieved national prominence. He built the Long Bridge over the Potomac at Washington, all the bridges on the Pennsylvania Railroad elevated systems in Washington, Wilmington, Chester and Camden, and the train sheds at Union Station, Pittsburgh, and at the Pennsylvania stations in Philadelphia, Camden and Jersey City. He was not married.

JAMES MACLAY, a member of the McNab & Harlin Mfg. Company, whose plant in Paterson is one of the largest of its kind in New Jersey, died Jan. 4 at his home in Paterson, aged 83 years. He was born in New York and 57 years ago went to Paterson, where he became identified with the firm which preceded the company of which Mr. Maclay was the last of the original members. He leaves his widow, one daughter and one son.

THOMAS O. MATTHEWS, vice-president of James H. Matthews & Co., manufacturer of stamps and dies, Pittsburgh, died at his home in that city Dec. 26, aged 41 years. He was born in Pittsburgh and was the son of John D. Matthews, whose business, founded in 1850, was conducted after his death by his sons. He leaves his widow and three children.

ALFRED BLUNT JENKINS, head of Jenkins Bros., 80 White Street, New York, manufacturers of valves and packing, died Dec. 29 at his home in Llewellyn Park, West Orange, N. J., aged 68 years. He was born in Boston and was a son of Nathaniel Jenkins, who established the business in which the sons formed a partnership in 1872.

HENRY SCHERER, SR., Fond du Lac, Wis., a pioneer manufacturer of files and rasps in the Northwest, died Dec. 25, aged 80 years. He was a native of Germany and learned the file trade at Albany, N. Y., going to Milwaukee in 1866. In the following year he established the Scherer File Company at Fond du Lac.

CHAUNCEY F. MATTESON, president Reedy Elevator Company, Hoboken, N. J., died at his home in Weehawken, N. J., Dec. 26, after an illness lasting several

months, aged 68 years. He was one of the pioneers in the manufacture of electrical elevators in this country. He leaves his widow, two sons and a daughter.

WILLIAM ROOT, superintendent of the American Manganese Steel Company, New Castle, Del., died Jan. 5 at his home in Wilmington, Del., aged 47 years. Death was due to pleurisy and followed a short illness. He leaves his widow and one son.

CHARLES OTIS EDDY, purchasing agent of the Janesville Machine Company, Janesville, Wis., died suddenly Jan. 1 from the effects of an operation for appendicitis on Dec. 3. He was born in Beaver Valley, Pa., July 23, 1883.

HARRY HOUSEMAN died from heart disease, Dec. 30, at his home at Somerton, Philadelphia, aged 52 years. He was president of the Standard Machine Company. He leaves his widow and four children, one of whom, Harold Houseman, has been associated with him in business.

THOMAS HOWARD BAKEWELL, one of the organizers of the Duquesne Steel Foundry Company, whose plant is at Kendall, near Pittsburgh, died Jan. 8 at his home in that city, aged 65 years. He was vice-president and treasurer and a director of the company at the time of his death.

ARCHIBALD COLVILLE, chairman of David Colville & Sons, Ltd., Dalzell Steel and Iron Works, Motherwell, England, died at his home Dec. 11.

Steel Corporation's Order Book Still Larger

Unfilled orders on the books of the U. S. Steel Corporation at the close of business on Dec. 31, 1916, were 11,547,286 tons, the largest total ever recorded. This was an increase of 488,744 tons over the orders reported as unfilled on Nov. 30, 1916, a month previous. The orders at present are over three times those at the same time two years ago. The following table gives the unfilled tonnage at the end of each month from January, 1913:

	1916	1915	1914	1913
January	7,922,767	4,248,571	4,613,680	7,827,368
February	8,568,966	4,345,371	5,026,440	7,656,714
March	9,331,001	4,255,749	4,653,825	7,468,956
April	9,829,551	4,162,244	4,277,068	6,978,762
May	9,937,798	4,264,598	3,998,160	6,324,322
June	9,640,458	4,678,196	4,032,857	5,807,317
July	9,593,592	4,928,540	4,158,589	5,390,356
August	9,660,357	4,908,445	4,213,331	5,223,468
September	9,522,584	5,317,618	2,787,667	5,003,785
October	10,015,260	6,165,452	3,461,097	4,513,767
November	11,058,542	7,189,489	3,324,592	4,396,347
December	11,547,286	7,806,220	3,836,643	4,282,108

Removing Rust from Steel Electrolytically

Removing rust or oxide from iron or steel by an electrolytic process is suggested by a patent (U. S. 1,195,704) taken out by Pascal Marino, London, England. The object to be treated is made the cathode in an electrolyte containing phosphoric acid, made by adding 10 parts of acid to 90 parts of water or by adding 10 per cent of the phosphoric acid to a 10 per cent solution of sodium phosphate. A temperature of 50 to 70 deg. C. is used.

American Foundrymen's Convention

The convention and exhibition of the American Foundrymen's Association will be held the week beginning Sept. 24, in Boston, with the exhibition in Mechanics' Building.

The Enterprise Machinery Company, 34 South Clinton Street, Chicago, Ill., has placed a small power punch press on the market. It is designed to be bolted in place on a bench and is intended for use in the manufacture of light metal, fiber and wire work. An automatic feed for high-speed production is provided and by bolting the press at an angle gravity discharge can be secured. The press has a $\frac{3}{4}$ -in. stroke, a $\frac{1}{2}$ -in. adjustment, a throat 3 $\frac{1}{2}$ in. deep and a die space of 4 in. It is 20 in. high and weighs 110 lb.

New England Profit-Sharing Plans

The Deane Steam Pump Company, Holyoke, Mass., has inaugurated a bonus plan as follows: Employees (day workers and piece workers) who are in the service of the company during January, 1917, will receive a bonus of 7 per cent computed on their earnings for January. Employees in the service of the company January and February will receive a bonus of 8 per cent on their earnings for February. Employees in the service of the company January, February and March will receive a bonus of 9 per cent on their earnings for March. Employees in the service of the company January, February, March and April will receive a bonus of 10 per cent on their earnings for April. Thereafter, and until further notice, the bonus of 10 per cent on the monthly earnings will be continued as long as the employee shall remain in the service of the company.

The Wright Wire Company, Worcester, Mass., has inaugurated a bonus system affecting about 900 employees. The amount varies according to a schedule which has not been published. The company has also taken group insurance for all of its employees, varying from \$200 to \$1,000, depending on the length of their terms of service.

The Peck & Young Company, Bristol, Conn., has announced a profit-sharing plan which will give to its employees an extra stipend of 10 per cent of their wages.

The Wallace Barnes Company, Bristol, Conn., gave its 600 employees an extra week's pay at Christmas.

The American Brass Company, Waterbury, Conn., through its treasurer, John P. Elton, has made the following statement: "In addition to the 10 per cent bonus, paid by the American Brass Company to its salaried employees during the year 1916, an additional bonus of 25 per cent will be paid. During the year various advances in wages have been made to others than salaried employees, and the above bonus is designed to give the salaried employees of the company about the same percentage of increase that has been received by those working on a daily or hourly basis. Ten per cent will be added to the rates formerly paid to said employees for the coming year. Beginning with the year 1917 all employees of the company other than salaried people above mentioned will receive a straight advance of 2½c. per hr. and such adjustment of payment to others will be made as will be equitable."

Osborn Company's Employees Meet

The Harmony Club, composed of officers, the sales force and heads of departments of the J. M. & L. A. Osborn Company, Cleveland, held its fourth annual meeting Jan. 3, 4 and 5. Each member was given the opportunity to present for general discussion problems in which he felt the need of assistance in his work and suggestions as to how working conditions may be improved. This brought out valuable ideas. At a joint meeting of the Harmony and Unity Clubs held at the Cleveland Athletic Club, Jan. 3, J. S. Knox spoke on "Harmony and Efficiency." On the evening of Jan. 4 a dinner was given at the Hollenden Hotel for members and their ladies. After the closing session of the club the members assembled as employees of the company and received their share of the substantial bonus which is yearly presented by the J. M. & L. A. Osborn Company.

The receivership of the Termaat & Monahan Company, Oshkosh, Wis., has been extended from Jan. 10, the original limit, to March 15. The company is being operated as a going concern by the Oshkosh Savings & Trust Company. The summary of the inventory on Jan. 1 places the assets at \$234,255 and the liabilities at \$134,067. The assets do not include patterns and drawings valued at \$21,351 and patents valued at \$27,642. Under the direction of the receiver a large contract for the manufacture of lathes for the Lodge & Shipley Machine Tool Company is being fulfilled.

Landers, Frary & Clark, New Britain, Conn., have increased their capital stock \$1,000,000, making a total of \$5,000,000.

Midvale Offer of Stock to Employees

The Midvale Steel & Ordnance Company offered on Jan. 3 to officers and employees an opportunity to subscribe for 6000 shares of its stock. A subscription price of \$60 per share (par value \$50) was made, and the following table shows the maximum number of shares which may be subscribed for by the individual:

Employees Receiving Annual Salaries or Wages of	May Subscribe for a Maximum Number of
\$600 or less	2 shares
600.01 to 1,200	3 shares
1,200.01 to 1,800	4 shares
1,800.01 to 2,400	5 shares
2,500.01 to 3,300	6 shares
3,300.01 to 4,200	7 shares

Employees receiving salaries in excess of \$4,200 per annum will be entitled to subscribe for 7 shares, and in addition one share for each \$1,200 of the excess of their respective salaries above \$4,200. Not more than 20 shares will be allotted to one subscriber.

Payment of subscriptions may be in monthly instalments, to be deducted from the salary or wages of the subscriber. No instalment may be less than \$2 per share, and must not exceed one-fourth of any month's salary or wages. Payment for the stock must be completed within three years, that is, not later than Dec. 31, 1919; interest at 5 per cent per annum will be charged on deferred payments. Dividends or special allowances will be credited to the account of the subscriber as part of his payment.

If a subscriber keeps all shares subscribed for and in January of each year for five years, commencing January, 1918, exhibits the certificate to the treasurer of his company, together with a statement from an official designated for the purpose, that he has been continuously in the employ of the company during the preceding year, and has shown a proper interest in its welfare, the company will guarantee to him that for a period of five years, i.e. for the years 1917, 1918, 1919, 1920 and 1921, each share of stock purchased under this plan will receive not less than \$6 per share per annum, either from dividends declared in the usual manner on all of the stock of the company, or by way of special payment or from both sources. The intent of the guaranty is that in the event that such dividends in any of the five years mentioned should be less than \$6 per share, then this company will pay to the subscriber such amounts as may be necessary to bring the total payments or credits up to a return of 10 per cent on the purchase price of the stock.

If subscriber is permanently disabled during the five-year period, whether such disability is incurred in the course of his employment or otherwise, and he still retains his certificate, the guaranty of this company as to income on his stock will be continued until the end of the five-year period, providing the certificate is continued in his name. If payments have not been completed, the subscriber may either continue monthly payments or complete payments in a lump sum and the guaranty of income will then be continued until the end of the five-year period. Otherwise the net amount of all payments received after deducting 5 per cent for deferred payments and adding the guaranteed income to date of settlement will be paid to the subscriber and the subscription will be cancelled.

Subscribers whose employment has been suspended owing to the temporary closing of a plant, or department, and who shall continue ready and willing, when required, to resume their service, will not be deprived of any benefits in connection with their subscriptions to which they would otherwise be entitled, even though they may have worked for another employer during such suspension. During suspension of employment monthly payments will not be required, and the period of suspension will not be counted as part of the three years limited for full payment of the subscription. In case of permanent disability during suspension of employment, the subscriber will be entitled to the same benefits as if the permanent disability had occurred while actually employed.

Subscriptions are to be received until Jan. 29.

Pittsburgh and Nearby Districts

The regular monthly meeting of the Association of Iron and Steel Electrical Engineers will be held in the Fort Pitt Hotel, Pittsburgh, on Saturday, Jan. 20, preceded by a dinner. Papers on "Direct Current and Alternating Current Automatic Skip and Bell Hoists" will be presented by H. D. James, Westinghouse Electric & Mfg. Company; Frank Smith, Otis Elevator Company; R. H. McLain, General Electric Company, and F. J. Burd, Cutler Hammer Mfg. Company. The February meeting will be held in the same hotel Feb. 17, and will be under the auspices of the safety committee, of which H. A. Schultz is chairman.

E. W. Mudge & Co., Frick Building, Pittsburgh, have bought the property of the Reliance Coke Company, formerly owned by the Fownes interests. It includes 550 acres of valuable coal lands and 236 pusher coke ovens, located at Brownsville, Pa., and all dwelling houses, railroad tracks and other assets. The plant is modern, and the coke has had a high reputation from the start. The output is from 18,000 to 20,000 tons per month, part of which will be used in the Claire furnace at Sharpville, Pa., formerly owned by M. A. Hanna & Co., but which came into possession of E. W. Mudge & Co. Jan. 1. The offices of the Reliance Coke Company, which were in the German National Bank Building, are being removed to the Frick Building.

The Sistersville Boiler Works, Sistersville, W. Va., has awarded contract to the Bellefontaine Bridge & Steel Company, Bellefontaine, Ohio, for a new plant to be erected along the Baltimore & Ohio Railroad tracks in Sistersville at a cost of \$25,000. It will be composed of three bays and will be equipped to handle all kinds of structural, tank and boiler work.

Last week the sales managers of the Witherow Steel Company met in the general offices at Pittsburgh and discussed plans for the new year. The salesmen were guests of the company at a dinner and a theater party and were taken on an inspection trip of the company's plant now being built on Neville Island, Pittsburgh, which will shortly be ready for operation.

The plate mill bought recently by the Jones & Laughlin Steel Company will be installed in its Soho works in Pittsburgh. It will take some months to set up the mill, and a good part of the output will then be used in the company's pipe mills at Aliquippa, Pa.

The National Tube Company has bought from the Pittsburgh Coal Company about 3½ acres of ground at McKeesport, Pa., and has also bought ground on which was located the Demmler works of the American Sheet & Tin Plate Company a short distance east of McKeesport. The Demmler works have not been operated for some years. The purchase of these two pieces of property gives the National Tube Company 12 acres, which it will use at some time for extensions to its National works.

Stockholders of the Carbon Steel Company will meet Jan. 15 to consider a plan for transferring the assets and business of the company to a new corporation organized under the laws of Pennsylvania, and also for readjusting the outstanding stock. The company now operates under a West Virginia charter, but it desires to operate under a Pennsylvania charter.

The Buckeye Twist Drill Company, Alliance, Ohio, has increased its capital from \$150,000 to \$1,000,000, and it is said will make large additions to its plant.

Last week the Youngstown Sheet & Tube Company, Youngstown, Ohio, paid off bonds to the amount of \$1,545,000. With interest charges, the sum paid was \$1,668,600.

Orders received by the Westinghouse Electric & Mfg. Company in December, aside from war contracts, are said to have amounted to about \$12,000,000, making a new record. The company has purchased a large interest in the Pan-American Debenture Corporation, formerly the Public Utility Debenture Corporation, which plans to enlarge its operations, particularly in South American investments.

The property of the Rices Landing Coal & Coke Company, Rices Landing, Pa., has been purchased by the H. C. Frick Coke Company. The transfer includes 437 acres of the Pittsburgh, or River, vein of coal, 134 acres of surface, five lots in Rices Landing, and the tipples and other works.

The Chamber of Commerce at Pittsburgh plans to raise a fund of \$50,000 for the purpose of attracting conventions to the city this year.

The Huessener Engineering Company, Bradshaw-Huessener economical gas combustion, Oliver Building, Pittsburgh, has recently booked the following orders: Marting Iron & Steel Company, Ironton, Ohio, repeat order, 3400 hp.; Ella Furnace Company, West Middlesex, Pa., 1600 hp.; McKeefrey Iron Company, Leetonia, Ohio, repeat order, 500 hp.; American Manganese Mfg. Company, Dunbar, Pa., 1600 hp.; Cleveland Furnace Company, Cleveland, 6800 hp. The company has acquired the exclusive license from J. I. Larimer, assistant general superintendent of the Illinois Steel Company, Joliet, Ill., for his four-pass stove.

The Standard Slag Company, Youngstown, Ohio, will shortly increase its capital stock from \$250,000 to \$500,000. It expects to erect several additional slag recovery plants in eastern Ohio.

The Youngstown Sheet & Tube Company has bought about 860 acres of coal lands in Cumberland Township, Greene County, Pa. The price paid was \$515 per acre. The coal will be used in the company's Koppers by-product coke ovens at East Youngstown, Ohio, and is said to be particularly suitable for this purpose.

The Allegheny Steel Tank Car Company, Warren, Pa., has been incorporated with a capital of \$100,000. The incorporators are G. L. Craft, U. G. Lyons, H. D. Kopf, A. J. Hazeltine, H. A. Logan and Joseph A. Schofield, all of Warren, and William Muir, of Titusville, Pa.

Prices on coal in the Pittsburgh district eased off considerably the past week. Slack and mine-run coal are quoted at \$4 to \$4.25, and ¾-in. gas coal at \$4.25 to \$4.50 per net ton. Operators are still quoting as high as \$2.75 to \$3 per ton for run-of-mine coal on contracts for shipments starting April 1.

The Topping Motor Truck & Machinery Company, Pittsburgh, with \$25,000 capital stock, has been incorporated by Charles T. Topping, John Pfeil and Oscar Wilson, Pittsburgh.

The Myersdale Handle Company, Myersdale, Pa., with \$15,000 capital stock, has been incorporated to manufacture tools and tool handles of metal and wood, by H. B. Snider, Jonas H. Lenhart, W. H. Dill, George Logue, J. M. Schlicht and Frank W. Layton.

The Tech Mfg. Company, Pittsburgh, with \$10,000 capital stock, has been chartered to manufacture electrical and mechanical specialties by A. H. Leser, 5331 Reeler Street, Pittsburgh; B. Zabel, 174 Lloyd Avenue, and M. W. Stoner, Maple Lane, Edgewood.

The Erie City Iron Works, Erie, Pa., has awarded contract for the erection of a one-story addition, 38 x 229 ft., to its plant on East Avenue and the Lake Shore Railroad, at a cost of about \$24,000.

New Corrigan-McKinney Furnace Started

Corrigan, McKinney & Co., Cleveland, blew in their new No. 4 blast furnace Dec. 30. This firm now has its four furnaces in Cleveland in operation, having started up its No. 3 furnace May 13, 1916. Two of its furnaces are running on foundry iron and two on basic. The two new furnaces have a daily capacity of about 600 tons each. The erection of these furnaces was part of the building program in connection with the building of the new steel plant which requires the output of two furnaces, leaving two for the production of merchant iron, thus preserving the same merchant furnace capacity in Cleveland that the firm had before erecting its steel plant. Two Corrigan-McKinney furnaces—Scottdale and one Josephine—blew out in December for relining.

The Ladish Obenberger Company, Cudahy, Wis., has changed its name to Ladish Drop Forge Company.

New Crane Plant at Milwaukee

The Milwaukee Electric Crane & Mfg. Company, Milwaukee, is in process of organization. On March 1 it will begin the manufacture of electric traveling and hand cranes, hoists, etc., at West Allis, Wis., in the former plant of the Fred M. Prescott Steam Pump Company, just purchased from the Worthington interests. The new company is organized by five former officials of the Pawling & Harnischfeger Company, Milwaukee, as follows: M. A. Beck, chief engineer; Arthur A. Fritsch, sales engineer; S. H. Squier, secretary and advertising manager; Arthur Mayer, chief estimator, and Leo Mayer, designer. The articles of incorporation, to be filed on or about Jan. 15, will name a capital stock of \$300,000, which later will be increased to \$1,000,000 to provide for an issue of \$300,000 preferred and \$700,000 common stock. The Prescott plant is now being overhauled and made ready for the installation of much new machine-tool and other equipment. It is a complete machine shop and foundry for the manufacture of steam pumps and consists of a foundry, 80 x 280 ft.; machine shop, 80 x 325 ft., with a side bay, 80 x 285 ft.; pattern shop, 80 x 80 ft.; pattern storage, four-story, 60 x 80 ft.; smithy, 40 x 70 ft., and administration building, 40 x 60 ft., two stories and basement. The new equipment, already placed for delivery Feb. 15, consists of lathes and planing, milling, grinding and drilling machines, etc. Officers and directors will be elected Jan. 20 or 22. A considerable volume of orders has been booked.

Wharton Furnaces to Be Started

Plans have been made by J. Leonard Replogle and associates in the Wharton Steel Company to start up the three blast furnaces at Dover, N. J., acquired in December, as soon as relining and repairs can be completed. It is expected that 60 to 90 days will be required for this work. Two of the furnaces are of 500 tons daily capacity each and the third produces about 150 tons a day. Bessemer iron will be made at the outset, in view of the excellent demand for such iron for export, and one furnace may be operated on low phosphorus iron or on ferromanganese. A quantity of Lake Superior ore within the Bessemer limit is in stock and further Bessemer ores may be bought. The company's Hibernia mine will be started up for the production of ores for basic pig iron. The plans for a steel plant and for by-product coke ovens, which it is expected will be carried out at the Wharton property, are in abeyance for the present.

Ford Motor Company Free to Build Furnaces

In the suit brought by Dodge Brothers, Detroit, against the Ford Motor Company to enjoin the use of surplus profits in building blast furnaces in Detroit, the circuit judges in that city on Jan. 6 accepted a bond of \$10,000,000 to secure Dodge Brothers from any possible loss. The suit was started recently by John F. and Horace E. Dodge, automobile manufacturers, also stockholders in the Ford Company, who charged that Henry Ford's plans for spending large sums of money for the development of the company's business were reckless and unwise, and asked that Mr. Ford be compelled to disburse the company's profits as dividends. Contracts for the two Ford blast furnaces were placed recently, and it is understood that had the court enjoined the use of the company's profits in building the blast furnaces Mr. Ford would have gone ahead with the project individually.

The New Worth Steel Plant

With the contract placed for the structural steel work for the open-hearth building, the new Worth steel plant at Claymont, Del., is taking definite shape. The initial layout appears to call for three 90-ton open-hearth furnaces and it is expected that the plant will be making steel by September. It has a location which gives 3000 ft. of water frontage and the total area of the site comprises about 500 acres. Plans contemplate a 150-in. plate mill.

WOULD COST A BILLION

Government Plants for Full Munition Supply—Private Works Main Reliance

WASHINGTON, D. C., Jan. 9, 1917.—Government plants adequate to supply the army with munitions in the event of a war with a first-class power would cost approximately \$1,000,000,000, according to the report of the special board recently appointed by the Secretary of War "for the purpose of investigating and reporting upon the feasibility, desirability and practicability of the Government manufacturing arms, munitions and equipment." The board expresses the opinion that the construction of such plants is not to be thought of, but on the contrary private establishments should be largely relied upon for supplies of war material and that such plants should be encouraged to maintain the highest possible state of efficiency during time of peace in order that they may be ready to cooperate with the Government in any emergency. The findings and recommendations of the board are set forth in its report as follows:

"It is not desirable that the Government manufacture its arms, munitions and equipment exclusively.

"It is not feasible or practicable for it to do so, with any due regard to economy or to preparedness within a reasonable time.

"It is desirable that the Rock Island Arsenal be enlarged promptly and considerably, especially for the increased production of rifles.

"It is desirable that modern machinery and appliances be installed in all arsenals where needed.

"It is desirable to arrange with private industry for a portion of the supply of whatever reserves of arms, munitions and equipment are determined upon with due regard to the conversion of their plant to use in such connection in time of war.

"It is important to take into consideration the location as well as the organization of plants which are co-ordinated, with a view both to safety and facilities for distribution.

"It is important to accumulate at least a year's supply of all raw material which is needed in the manufacture of arms, munitions and equipment and is not to be found within continental United States.

"It is important to accumulate a full supply of drawings and gages sufficient to enable all co-ordinated industries to work to full capacity promptly.

"It is desirable to standardize gages, jigs and tools as far as practicable and as soon as practicable.

"It is exceedingly important that skilled and experienced labor in co-ordinated industries especially be enrolled, and in the event of war enlisted for work in selected factories.

"It is important that a comprehensive plan of organization for prompt expansion to full capacity, night and day, both in Government plants and in those of co-ordinated private industries be worked out and made ready for immediate use.

"It is important that the Government establish plants for the assemblage of field-gun ammunition at such points as may be best adapted thereto, with due regard to safety and facility for distribution.

"It is exceedingly important that our arsenals equipped for the manufacture of rifles and artillery be put to work at full capacity as early as possible."

W. L. C.

Sellers Mfg. Company Additions

The Sellers Mfg. Company installed in 1916 at its plant at Mayfair, Chicago, two 5-ton Whiting traveling cranes with 400 ft. of runway over the scrap yard, for the purpose of unloading scrap, and also built a steel piling shed and scrap cleaner. The company is now adding two rotary busheling and puddling furnaces to the four already installed and providing additional capacity for tie plates on its scrap bar train of rolls.

Customs Decisions

Aluminum Goods Dutiable as Manufactures Not Scrap

Failure of foreign manufacturers to live up to specified dimensions in turning out metal goods cannot operate under the tariff law to take such goods out of the regular provision even though the merchandise, by reason of such failure, is no longer fit for the use originally intended. According to a decision of the Board of United States General Appraisers, importers in cases of this kind must look to the manufacturers for redress, and not seek relief through the medium of lower duties.

The specific case before the customs tribunal enunciating the above principle was brought by the American Bronze Company, Buffalo, and related to an importation of certain articles composed of aluminum and intended for use in connection with electric wiring. The collector levied duty at the rate of 20 per cent under paragraph 167 as manufactures of metal not specially provided for. The importer claimed this return an error, basing the contention on the ground that the articles, although fully completed and composed wholly of new aluminum, were not in dimensions fully up to specifications, and consequently were not suitable for the particular purpose for which they were originally designed. It was, therefore, maintained that the merchandise was properly dutiable at only 2c. per lb. under paragraph 143, as aluminum scrap. Judge Fischer, in his decision, coincided in by the other members of the board, cited earlier decisions of the board and Federal courts, where a somewhat similar question, although applying to different merchandise, was at issue. Among the cases cited were those of the Illinois Central Railroad and other protestants. The case of the Illinois Central, cited as applicable in principle to this case, had to do with old steel rails, which retained their identity as rails, although because of their pattern were not likely to be so used. In spite of this, the courts held the railroad's importation to be dutiable as steel rails, rather than as scrap steel. In the present case, the board's decision, affirming the action of the Buffalo collector, said in part:

By its terms, the provision in paragraph 143 of the present tariff act is made to apply solely to the scrap consisting of the waste or offal of aluminum necessarily incident to the manufacture of aluminum articles. It has no reference whatever to the articles themselves, but merely to scrap aluminum material. The merchandise here under consideration consists of completely manufactured articles, and their status as such is not altered by the fact that the specifications were not fully complied with in the process of manufacture. Certain it is that they are not scrap material within the meaning of paragraph 143. Any such statement is absolutely refuted by a mere examination of the merchandise in evidence herein.

Quantities Must Be Proved in Protest Cases

The importance in customs protest cases of submitting to the board positive proof as to the exact quantities of imported merchandise was shown in a decision in the case of the Loomis Scrap Iron Company, Detroit. The firm imported 45,000 lb. of iron pipe, 28,000 lb. of which was claimed to consist of scrap fit only to be remanufactured. The protest as to classification was limited by the importers to the last-named amount of pipe, it being claimed that free entry should be given it as scrap fit only to be remanufactured. The collector took duty on the entire importation at 20 per cent under paragraph 127 of the tariff act as seamed iron pipe. The only witness stated the amount at 28,000 lb., that being the quantity he claimed was sold by him as scrap for remelting purposes. He, however, did not weigh the goods himself, nor did he produce the testimony of the person or persons who did weigh it. Judge Fischer, in his decision, said that the testimony of the witness was somewhat inconsistent. The board held that, on the record as presented, it was unable to specify precisely what quantity, if any, of the pipe was scrap fit only to be remanufactured. Under the circumstances, the protest was overruled in all respects.

Concentration of Welding Patents

The Thomson Spot Welding Company, which has been recently formed under the Massachusetts laws, has acquired all of the patents for the process of spot welding and spot welding machines formerly held by the Thomson Electric Welding Company and the Universal Electric Welding Company. It has also acquired all the physical assets and all the spot welding patents, etc., of the Toledo Electric Welder Company, Cincinnati, Ohio, which is being liquidated after having been forced in litigation to admit the validity of the Har-matta patent. The butt-welding machine business formerly conducted by this company has been taken over by the Thomson Electric Welding Company, Lynn, Mass., which will manufacture these machines in the future and look after the needs of the Toledo Electric Welder Company's customers.

Higley Machine Company Buys Plant

The Higley Machine Company, manufacturer of metal saws and grinders, has purchased a factory on Chestnut Street, South Norwalk, Conn., formerly occupied by the Boese-Peppard Company. It expects to start work in its new plant by the end of this month. In connection with the acquisition of the property the Higley Machine Company has increased its capital stock from \$25,000 to \$50,000. The Higley machines have heretofore been manufactured for the company by George Juengst & Sons, Croton Falls, N. Y. In undertaking the manufacture of its own line, the Higley Machine Company has no definite plans for manufacturing anything but its saws and grinding machines. The Vandyck-Churchill Company, Singer Building, New York, is its general selling agent.

New Company to Manufacture Tool Steel

Charles M. Hammond, who was formerly connected with the Halcomb and the Sanderson Steel companies, Syracuse, N. Y., has sold his interest in the Hammond Steel & Forging Company, Syracuse, N. Y., of which he was president and retired from the management of that company. He has been elected president of the Cayuga Tool Steel Company, Ltd., which has been formed for the manufacture of high-grade tool and alloy steels. The new company plans to erect and operate rolling mills, a hammer plant and crucible, electric and open-hearth furnaces at Auburn, N. Y.

Locomotive Orders

Orders for locomotives reported in the last two weeks are 101. Of these the Baldwin Locomotive Works will build 75 for the Pennsylvania Railroad and 10 for the Central Railroad of New Jersey, while the American Locomotive Company will furnish the Virginian Railroad with 10 Mallet locomotives. There have been inquiries for 38 locomotives in the same period, of which 35 are credited to the Northern Pacific.

The George Nash Company, 646 Washington Boulevard, Chicago, has added to its line of high-grade steel a cold-drawn seamless steel tubing department and is now carrying in stock a complete and large assortment of cold-drawn seamless steel tubes for immediate shipment. This Chicago stock, combined with the large stock carried in its New York, Boston and Philadelphia warehouses, enables the company to claim possession of the largest stock of seamless steel tubing in the United States.

The Virginia Iron, Coal and Coke Company is making repairs on its No. 1 stack, at Middlesboro, Ky., which will be put in blast at an early date. It will have an output of about 400 tons daily. S. E. Dock, consulting engineer for the company, has been on the ground making preparations for the construction of ore-roasting apparatus which will be added to the Middlesboro plant at a cost of \$50,000.

Machinery Markets and News of the Works

LARGE BUYING IN VIEW

General Electric Inquiry for 60 Tools

Big Railroad Lists Still Pending in Chicago— Machines Sought in New York for Russian Delivery

In no section of the country is there evidence of any halt in the pressure on the builders of machine tools. Some centers have not yet got under full headway after the slowing up incidental to the holidays, but considerable new business of large proportions is pending. The Cleveland market states that the General Electric Company is inquiring for 60 tools required for an addition to its plant at Erie, Pa. The Cleveland market also notes that deliveries on boring mills and planing and milling machines are slower than other lines.

In Chicago orders have not been placed as yet against the several large railroad lists recently issued with the exception of a few tools of a special nature purchased by the Union Pacific.

Some attractive business, mostly for export to Russia, is soon to be closed in New York. No large domestic propositions are before the trade in this city, but the aggregate of small sales is excellent.

Business in tools is a little slow in Detroit because of the automobile shows, which are engrossing the attention of the motor-building executives, but a spurt of expansion is expected as soon as the shows are concluded.

Cincinnati developed fast in an industrial way in 1916, no fewer than 310 local enterprises having been incorporated in that year. In that city Canadian orders are not so plentiful, but inquiries from Spain and Italy are coming to the front.

How shipbuilding has expanded on the Northwest is indicated by the fact that in Seattle alone the payrolls of the yards total \$600,000 monthly, whereas a year ago they were but \$70,000.

The feature of the Canadian market is the degree to which American manufacturers are establishing branch plants in the Dominion.

Shipbuilding plants are placing frequent orders in San Francisco, and all kinds of manufacture are exceedingly active, with the result that there is anticipation of great activity in the machinery line before February.

New York

New York, Jan. 10, 1917.

No large domestic inquiries are before the trade, but the volume of small scattered orders continues at a satisfactory level. The past week shows a betterment, of course, over the holiday week. New York dealers and branch managers have received several export inquiries of notable size, most of them for Russian delivery. The Aksai Company, which for some time has been negotiating for a large list of tools for shipment to Russia, is expected to close this week. The company's representatives have offices in the Holland House, New York.

Gaston, Williams & Wigmore, 140 Broadway, New York, are inquiring for a number of large turret lathes for bar

work, and the Rusco Company, 66 Leonard Street, New York, wants similar machines, but for chucking work.

Some attractive inquiries are out for lathes for export to France and Italy, the sizes wanted ranging from 14 to 20 in. swing.

The American Can Company has asked prices and deliveries on a few machine tools.

Deliveries on most tools would show improvement were it not for the bad railroad situation, which continues to delay machines en route, and likewise holds up payments, as buyers will not pay until delivery is made.

A large machinery export house has estimated the average advance in price of a large number of machine tools since the beginning of the war at 49 per cent. The average advance on 63 different tools, October, 1914, to October, 1916, was 46 per cent, but many of these are quoted higher to-day than in October.

The Magor Car Company, 30 Church Street, New York, was recently incorporated in New York State with a capital stock of \$400,000 and 3500 shares of no par value to carry on business with \$417,500. On account of the phenomenal growth of the Magor Car Company of New Jersey it was deemed advisable to materially increase the producing capacity of its works. The new corporation was formed in order to do this and to provide additional working capacity to handle the increased business. Both organizations are being carried on; but the Magor Car Company of New Jersey will turn over all its assets, liabilities, etc., to the new company at the end of this month, and will cease to exist. The new company takes over the increased plant facilities and additional real estate which has been acquired and will be conducted by the same officers and directors as the former. The company's output of cane cars, logging cars, mine and construction car equipment, box and flat cars is now about 7 times its original capacity 6 years ago.

The Tischler Roofing & Sheet Metal Works, 118 East 109th Street, New York, expects to remove its business to larger quarters some time this year. It is contemplating the manufacture of ash cans and similar products and may be in the market for the equipment to do this work. Adolph Tischler is president; F. W. Tischler, treasurer and B. M. Stein secretary.

The Dutchess Foundry Company, Poughkeepsie, N. Y., has purchased the building it occupies at 56 Pine Street and will start remodeling it in order to increase its floor space to handle greater output. William Wagnitz is president and John Van Zile is secretary and treasurer.

A. Allan & Son, 486 Greenwich Street, New York, are having plans prepared for a plant to be erected at Harrison, N. J., for the manufacture of bearing metals.

The Stamford Rolling Mills Company, Springdale, Conn., manufacturer of brass, copper and German silver, has increased its capital stock from \$2,335,000 to \$2,835,000.

The National Galvanizing & Plating Equipment Corporation has been incorporated with a capital stock of \$25,000 to take over the assets of the General Equipment Mfg. Company. G. T. Potthoff and K. T. Potthoff, owners of the latter company, are respectively president, and secretary and treasurer of the new company, and form with Frederick Sauer the board of directors.

The National Metal & Novelty Company, 150 Bleecker Street, New York, recently incorporated with a capital stock of \$10,000, will manufacture novelties and specialties. S. A. Spaziente is president and general manager, and A. D. Semisa is secretary.

The Hanson & Van Winkle Company, 269 Oliver Street, Newark, N. J., manufacturer of electroplating equipment, will build an extension to its plant, 25 x 75 ft., at Chestnut and Van Burch streets, to cost \$5,000.

The H. & M. Mfg. Company, Newark, N. J., has been incorporated with a capital of \$50,000 to manufacture automobile accessories. Philip J. Schotland, Joseph J. Pallitla and H. Kelly are the incorporators.

The Seaboard By-Products Coke Company, Kearny, N. J., has awarded a contract for the erection of two additional buildings at its new coke plant on the Hackensack River, to cost \$50,000, to the D. W. McGee Contracting Company, Newark.

The North American Copper Company, 52 Vanderbilt

Avenue, New York, has had plans prepared for a copper refining plant to be erected on the meadows, Kearny, N. J., between the Hackensack River and Hackensack Avenue.

The Cullen Vapor Heating Company, Jersey City, N. J., has been incorporated with a capital of \$50,000 to manufacture heating apparatus. Thomas J. Cullen, James F. McMullen and M. E. McCormack are the incorporators.

The New Toy Company, Inc., Newark, N. J., has been incorporated with a capital of \$300,000 to manufacture toys. Julius Adler, F. J. Schneek and Bernard Goldsmith are the incorporators.

Fire Jan. 5 destroyed the machine shop of William H. Clark & Son, 1427 Clinton Street, Hoboken, N. J., and the pattern shop of Abraham Wilson, adjoining, with a loss estimated at \$15,000.

F. H. Lovell & Co., Arlington, N. J., manufacturers of brass goods, are having plans prepared for an addition to their plant to cost about \$12,000.

The United Furnace Corporation, Garfield, N. J., has been incorporated with a capital stock of \$30,000 to manufacture furnaces and kindred products. John T. Harrop, Eli Harrop and George W. Harrop, Garfield, are the incorporators.

The National Pottery Company, 333 Sixth Avenue, Newark, N. J., has acquired a tract of land comprising 38 city lots at Belleville, fronting on the Erie Railroad and Little Street, and plans the erection of a plant. The first unit will cost about \$20,000.

The Keyport Dry Dock Company, 77 River Street, Hoboken, N. J., recently incorporated, is planning the immediate operation of a shipbuilding and repair plant at the foot of Prospect Street, Keyport, N. J. Gilbert A. Williams, formerly of Warwick, N. Y., will be in charge.

The American Ore Reduction Company, Perth Amboy, N. J., is building the first section of its proposed copper refining and reduction plant at Paterson and Second streets. E. G. Woodford, engineer, is in charge.

The Roessler & Hasslacher Chemical Company, Perth Amboy, N. J., has commenced the erection of its proposed new plant for the manufacture of coal-tar products at St. Albans, near Charleston, W. Va. The plant is estimated to cost \$500,000. Ralph N. Sargent, former works manager of plant No. 2, Perth Amboy, will be works manager of the new plant.

The R. G. Packard Company, Bayonne, N. J., manufacturer of dredging machinery, is reported planning the construction of a shipbuilding plant on property recently acquired on the Raritan River at Sayreville, N. J. R. G. Packard is president.

Fire Jan. 2 damaged the laboratory of the General Chemical Company, Camden, N. J., with a loss estimated at \$50,000.

The Forsythe Metal Goods Company, J. H. McCauley, president, 308 The Terrace, Buffalo, has let contract for the erection of a one-story factory, 50 x 130 ft., at East Aurora, N. Y.

The Globe Pattern Works, 39 Henry Street, Buffalo, will build a pattern shop 50 x 100 ft., two stories, on Henry Street.

The DuBois Piston Ring Company, Albany, N. Y., has been incorporated with a capitalization of \$180,000, and will equip a plant. W. F. Foksett, 22 North Pine Avenue, G. Y. Lansing, 294 State Street, E. A. Barvoets, 29 Delaware Terrace, are the incorporators.

The Bailey Non-Stall Differential Corporation, Millbrook, N. Y., has been incorporated, with a capital stock of \$105,000, to manufacture automobiles, aeroplanes, etc. The incorporators are H. S. Perrigo, 660 St. Nicholas Avenue, New York; F. H. Butchorn, 764 St. Johns Place, Brooklyn, and E. A. Gingrass, Englewood, N. J.

The Pressed & Welded Steel Products Company, Flushing, N. Y., is in the market now for squaring shears and circular shears of 3/16-in. soft steel capacity.

The National Fireproofing Company, Washington, N. J., is installing new machinery at its local plant to double the capacity.

The Celluloid Company, 290 Ferry Street, Newark, N. J., manufacturer of celluloid goods, will build 2 three-story reinforced-concrete additions to its plant, one 75 x 190 ft., to cost \$142,500; the other 48 x 95 ft., to cost \$45,000.

The Day-Elder Motors Corporation, Newark, N. J., has been incorporated with a capital stock of \$1,000,000 to manufacture motor trucks and automobiles. Charles P. Day, East Orange; Fred G. Elder, Glen Ridge, and Theodore McC. Marsh, Newark, are the incorporators.

The Bronze Products Society, 456 Fourth Avenue, New York, has increased its capital stock from \$1,000 to \$25,000, not to \$75,000, as has been stated.

C. Botjer & Sons, Inc., Jersey City, N. J., will build a one-story shop addition to its iron and steel plant on Eighteenth Street to cost \$15,000.

The Dolwood Machinery & Supply Company, Jersey City, N. J., has been incorporated with a capital of \$5,000 to manufacture machinery and tools. C. H. Jarvis, P. L. Nieser and John R. Turner, Jersey City, are the incorporators.

The Mengel Box Company, West Newark Avenue, Jersey City, N. J., manufacturer of cigar boxes, packing cases, etc., has increased its capital stock from \$5,000,000 to \$6,000,000, to provide for business extensions.

Joseph L. King, Arlington, N. J., and associates, have incorporated in Pennsylvania the Steel Shod Shoe Company of Williamsport, Pa., with a capital of \$100,000.

The Auto Products Mfg. Company, Buffalo, has filed incorporation papers with a capital stock of \$35,000. W. Willett, 12 Eighteenth Street., A. J. Williams, 294 North Division Street, Buffalo, and J. B. Curtiss, Fort Erie, Ont., are the incorporators.

Incorporation papers have been filed by the Lapp Insulator Company, Leroy, N. Y., with a capital stock of \$150,000, to manufacture electrical and mechanical apparatus. S. Levy, S. W. Rippey and J. B. Abbott, Geneseo, N. Y., are the incorporators.

The New York Air Brake Company, Watertown, N. Y., has awarded contract for an addition to its plant to the Hydraulic Construction Company, Watertown.

Plans have been completed by John A. Benschel, 111 Broadway, New York, consulting engineer, for a hydroelectric plant at the Oswego River Dam No. 6. The power house is to be 50 x 120 ft. The estimated cost of plant and equipment is \$600,000.

Philadelphia

PHILADELPHIA, PA., Jan. 8, 1917.

The business of the Domestic Machinery Works, Vankirk and Erdrich streets, Philadelphia, has been incorporated under the style of the Richter Machine Company. Wolfgang Richter is president and F. V. McMullin of the Pennsylvania Forge Company is secretary and treasurer. The company manufactures full fashioned hosiery machinery and supplies and is capitalized at \$100,000.

The Bureau of Yards and Docks, Navy Department, Washington, will make improvements at the League Island Navy Yard, Philadelphia, to cost several million dollars. It will take bids shortly for the erection of a one and two-story structural shop, 200 x 700 ft., to cost about \$600,000 and for a machine shop, 150 x 500 ft., to cost about \$500,000. It has completed plans for a foundry, one and two stories, 225 x 500 ft., estimated to cost \$500,000. A power plant with two traveling cranes to cost about \$150,000, a drydock, 1100 ft. in length, and a construction slip are also planned.

The North American Motors Company, Pottstown, Pa., has completed plans for a one and two-story factory building, 150 x 250 ft. to cost about \$25,000.

Schiller, Nolan & Co., 820 Cherry Street, Philadelphia, operating machine repair shops, has awarded contract for a two-story brick machine shop, 35 x 55 ft., at Darien and Wood streets.

The Weidemann Machine Company, Philadelphia, has awarded contract for a one-story machine shop, 98 x 158 ft., at Gratz Street and Sedgley Avenue, at a cost of \$20,000, to Barclay White & Co., Philadelphia. The company has been incorporated with a capital stock of \$25,000 by Theodore Weidemann, Norristown; Henry Bockrath, 2121 Bellevue Street; William S. Crowder, 205 West Upsal Street and Herbert L. Howland, 1649 North Redfield Street, Philadelphia.

The Hunter Pressed Steel Company, Philadelphia, has been incorporated with capital of \$25,000 to manufacture pressed steel specialties. Edward F. Burrow, 1831 North Park Avenue, is president.

The Headley Good Roads Company, Thirtieth and Spruce streets, Philadelphia, will build a new road oil manufacturing plant at Marcus Hook to cost about \$30,000.

The Westinghouse Lamp Company, 165 Broadway, New York, has acquired a tract of about 5½ acres on Pennington Avenue, Trenton, N. J., on the Philadelphia & Reading Railroad, as a site for a new plant, to employ about 500 men. It is said that plans for the proposed plant are now being prepared.

The Camden Iron Works, Camden, N. J., manufacturer of cast-iron pipe and hydraulic equipment, will build a one-story brick and steel addition to its plant, 52 x 60 ft.

The Braemer Air Conditioning Corporation, Camden, N. J., has been incorporated with a capital stock of \$200,000 to manufacture air purifying machinery. William G. R. Braemer, Herbert Coward, B. L. Braemer and H. A. Terrell are the incorporators.

John E. Hand & Son, Atco, N. J., manufacturers of

medical instruments, has acquired the former factory of the Starr Milk Cooler Company, Haddonfield, and will equip it for the manufacture of its specialties. About 100 workers will be employed for initial operations.

The American Manganese Bronze Company, Holmesburg, Pa., has had plans prepared for a pattern shop addition, 64 x 120 ft.

The Glasgow Iron Company, Pottstown, Pa., is planning for the installation of new boilers at its puddle mill.

The Guerber Engineering Company, Bethlehem, Pa., will purchase a 5 or 10-ton locomotive crane in first-class condition for handling material.

The F. R. Phillips and Sons Company, Philadelphia, capital \$100,000, has been chartered to manufacture iron, steel, other metals and machinery by W. Vernon, F. Rees, John H. and Emily Mary Phillips, Lansdowne, Pa., and Waldo L. Phillips, 114 West 79th Street, New York.

The Dunmore Mfg. Company, Reading, Pa., has been incorporated with capital of \$75,000 by Edwin S. Smith, W. Stewart Wray and D. Elmer Worley, Reading, to manufacture machinery, gears, gear wheels and tools of iron and steel.

Fire Dec. 27 destroyed the main building of the box manufacturing plant of J. Frank Bowman, Lancaster, Pa., with loss, including machinery, of about \$30,000.

The Traylor Motor Car Company, Allentown, Pa., has acquired a site for a large commercial garage and repair shop at Reading to cost about \$50,000.

C. V. Hill & Co., Trenton, N. J., manufacturers of refrigerators, has filed articles of incorporation with a capital stock of \$300,000. Clement V. and Albert M. Hill and Alfred M. Titus are the incorporators.

The Ohio Brass Company, Mansfield, Ohio, manufacturer of mine haulage apparatus, electric railway specialties, etc., a New Jersey corporation, has filed articles of increase of capital at Trenton, from \$1,000,000 to \$2,000,000.

The Wainford-Darling Company, Trenton, N. J., has been incorporated with a capital stock of \$50,000 to manufacture engines. Richard H. Wainford, James Turner and Harry Darling are the incorporators.

The Fullard Mfg. Company, Burlington, N. J., has been incorporated with a capital stock of \$50,000 to manufacture air-heating machines. William Fullard, Harry C. Hochstadler and P. T. Lyons, Sr., are the incorporators.

The Stranahan Gear Company, 1016 Hamilton Street, Philadelphia, has increased its capital stock from \$20,000 to \$60,000.

The I. C. Imboden Mfg. Company, Cleona, Pa., has been chartered by Isaac C., Sarah K., Herman S. and Stella S. Imboden, to manufacture wringers, turn buckles, rakes, stove lid lifters and other metal devices. The new incorporation is capitalized at \$25,000.

The Frissell Mfg. Company, North Wales, Pa., capital \$10,000, has been chartered to manufacture webbing and belting for machinery belts, etc. Frederick D. and Agnes Frissell and John R. Shurley, North Wales, are the incorporators.

Baltimore

BALTIMORE, MD., Jan. 8, 1917.

The Bureau of Yards and Docks, Navy Department, Washington, is preparing plans for new buildings at the Norfolk Navy Yard. The specifications will include a machine shop, one and two stories, 150 x 500 ft., to cost about \$500,000, and a foundry, one and two stories, 225 x 500 ft., to cost about \$500,000.

The Norfolk & Western Railroad is said to be planning the establishment of shops at Shenandoah, Va., to cost about \$85,000. H. F. Greenwood, Roanoke, Va., is superintendent of shops.

The Electric Smelting Corporation, Wilcomico and Bayard streets, Baltimore, has been incorporated with \$100,000 capital stock to manufacture electric furnaces for melting metals. The incorporators are Adolph Schoeneis, 727 Law Building, Baltimore, and John F. and Katharina Dirzuweit.

The Arundel Shipbuilding Company, Fairfield, Md., has been incorporated with \$500,000 capital stock. The incorporators are Charles H. Knapp, 1419 Fidelity Building, Baltimore; Joseph J. Hock and Joseph N. Ulman.

The Aluminum Ore Company, which recently announced it would locate a plant at Sollers Point, Md., has taken title to a 141-acre tract. Definite building plans have not been announced.

The DuPont Powder Company, Hopewell, Va., will install a steam turbine engine and generator.

With \$100,000 capital stock the Taylor Registering Projector Company, Baltimore, has been incorporated by Arthur

K. Taylor, 420 Forest Road; Enoch Harlan and Dr. Donald R. Hooker. It is understood the company plans to manufacture a patent printing machine.

Work is being rushed on a new storage warehouse for the Speakman Supply & Pipe Company, Wilmington, Del.

W. E. Peck & Co. has established a wire-working plant on Greenmount Avenue near Eager Street, Baltimore.

Work is being rushed on a new tool and shipbuilding shed at the plant of the Pusey & Jones Company, Wilmington, Del.

The Dixie Mfg. Company, Russell and Stockholm streets, Baltimore, manufacturer of exhaust and blow piping and dust collectors, will build a two-story addition to its plant to cost about \$20,000.

The Superior Steel Corporation, Richmond, Va., has been chartered with \$17,000,000 capital stock. Matthew Rogers, Philadelphia, is president; William J. Shafer, Marlton, N. Y., treasurer, and Andrew D. Christian, Richmond, secretary. The main offices will be in Richmond.

It is announced that the plant of the New York & Hagerstown Metal Stamping Company, Hagerstown, Md., owned by the Poole Engineering & Machine Company, Woodberry, Md., will be doubled. It employs about 250 men.

New England

BOSTON, MASS., Jan. 8, 1917.

The Ramsdell Specialty Company, Worcester, Mass., has been incorporated with a capital stock of \$100,000 to manufacture machine screws, etc. The directors are Frederick M. Ramsdell, president; Louis A. Ford, 8 Clifton Street, Worcester, treasurer, and G. A. Quinn.

The Birchall Mfg. Company, Providence, R. I., has been incorporated to manufacture fuel mixers, etc., with capital stock of \$100,000. The incorporators are George A. Bertsch, William D. Nisbet and Alfred T. Ward, 535 Grosvenor Building, Providence, R. I.

The Platt Brothers Company, Brown Street, Waterbury, Conn., has been granted a permit for an addition to its plant on Thomaston Avenue, 100 x 180 ft., one story.

Hamilton & De Loss, Inc., Bridgeport, Conn., has been incorporated with an authorized capital stock of \$300,000 to manufacture metal goods, etc. The incorporators are Harold H. Hamilton, Harry H. De Loss and James A. Marr. It is reported that it will soon erect a plant in Fairfield, Conn.

Chicago

CHICAGO, ILL., Jan. 8, 1917.

The several large lists of machine-tool requirements issued by Western railroads, including the Burlington, Great Northern, Omaha and Union Pacific, together with the needs of the Rock Island Arsenal small arms plant, continue the feature business here. With the exception of a few tools bought by the Union Pacific, largely of a special nature, no purchases have been made as yet against these lists. Further large purchases of equipment for export are being negotiated, particularly to France. Trade in normal domestic channels is holding up in better than usual volume and no curtailment of expansion in manufacturing plants has begun to appear.

The retirement of Alfred Marshall from active participation in the machine-tool business is made known in the following announcement: "The Marshall & Huschart Machinery Company, 17 South Jefferson Street, Chicago, on Jan. 3 elected the following officers: H. W. Jones, president; George C. Edwards, vice-president; William H. Reid, treasurer; Frank Feese, secretary; J. R. Porter, general manager. All these men have been with the company a great many years and now assume active control of affairs. Mr. Marshall, founder of the company, has resigned as president, but has retained a financial interest and will act in an advisory capacity. There will be no change in the general policy of the company."

The Giant Truck & Wheel Corporation, 10 South La Salle Street, Chicago, has been organized by A. L. Richtmyre, C. S. Wheeler, O. G. Ryden, with a capital of \$2,500.

The Aldon Company, E. W. K. Roe, president, 53 West Jackson Boulevard, Chicago, has awarded contracts for a shop at 3336 Ravenswood Avenue. It will manufacture railway supplies.

The H. A. Stocker Machinery Company, Chicago, has changed its corporate style to the Stocker-Rumely Wachs Company and maintains its office at 117 North Jefferson Street, Chicago.

The Cleveland Galvanizing Works Company, Cleveland, Ohio, has opened Chicago offices at 334 New York Life Build-

ing, 39 South La Salle Street. The new office will be for some time the headquarters, of W. A. Ahrens, who has handled the company's brands of weldless wire chain. The company has recently considerably enlarged its capacity by adding another unit to its factory group and is reported to be working 24 hours per day.

The Appleby Hinge Mfg. Company, Chicago, has been organized with a capital of \$2,500 by William K. Appleby, Daniel S. Gillespie, 1210 Fry Street, and William A. Jennings.

E. W. K. Roe, 53 West Jackson Boulevard, Chicago, will erect a one-story brick factory at 3338-40 East Ravenswood Avenue at a cost of \$10,000.

The Reder Foundry Company, Chicago, has purchased a site on the Chicago & Alton right-of-way at the corner of Oakley Avenue and Thirty-fifth Place, on which it will erect a foundry at an estimated cost of \$30,000.

The Acme Valve Company, care of John W. Hill, 53 West Jackson Boulevard, Chicago, has been incorporated with a capital of \$15,000.

The National Mfg. Company, Manchester, Iowa, has been organized with a capital of \$50,000 to manufacture farm and garden implements and steel gates. The officers are A. M. Cloud, president; H. M. Bradley, vice-president; C. G. Yoran, secretary, and F. E. Dutton, treasurer.

The Holland Furnace Company, Holland, Mich., will erect a branch factory at Cedar Rapids, Iowa, 160 x 400 ft., to be ready for occupancy by May.

The American Hoist & Derrick Company, St. Paul, Minn., will erect a one-story addition to its machine shop.

The Morris Paper Mills, Morris, Ill., has had plans prepared for a one-story box factory, 130 x 140 ft., of mill construction to cost about \$12,000. H. B. Sturges, 19 South La Salle Street, Chicago, is the architect.

The Brown Motors Company, 209 Reliance Building, Moline, Ill., recently incorporated, will manufacture an annular valve gasoline motor for pleasure and commercial vehicles.

The Viking Pump Company, Cedar Falls, Iowa, will erect a new plant early this year.

The Iowa Gate Company, Cedar Falls, Iowa, has in contemplation the enlargement of its plant for the manufacture of farm gates and implements.

The Globe Machinery & Supply Company, Des Moines, Iowa, has purchased adjoining property, but does not plan to erect any new buildings for perhaps three or five years. F. W. Swanson is general manager.

Plans are being made to move the Toliver Punctureproof Tube Company from its quarters at 1322 Broadway, Denver, Col., to its new quarters, which have a capacity of 500 tubes per day. The business of the Toliver Punctureproof Tube Company has expanded during its year in business so that it was impossible to handle it in its present plant. The company plans to do about \$250,000 worth of business in 1917. Joseph Stein is vice-president and general manager.

Detroit

DETROIT, MICH., Jan. 8, 1917.

Machine-tool dealers state that automobile shows are causing a temporary lull in the market. Many of the largest factories expect to begin expansion work as soon as they are over. Machinery jobbers expect 1917 to be the biggest year in the history of the business in this State.

Deliveries on milling machines are extremely slow, 6 months being required in most cases. Grinding machines are more easily obtainable than for some time.

The Campbell Folding Crate Company, Elk Rapids, Mich., will move to Traverse City, Mich., where it will occupy the factory of the W. E. Williams Lumber Company. Fred Smith, Elk Rapids, is owner of the company.

William Horner, Grand Rapids, Mich., manufacturer of hardwood flooring, is erecting in Newberry, Mich., a factory with 95,000 sq. ft. of floor space, which will have a capacity of 100,000 ft. of flooring per day.

The Lakey Foundry Company, Muskegon, Mich., will soon begin the erection of a foundry, 200 x 310 ft., which will more than treble its present output. It is expected to be completed July 1.

William Werk, resident engineer in charge of the construction of the Grand Trunk shops at Port Huron, Mich., announces that work will be pushed this winter in order to complete the shops in July instead of September.

The Michigan Screws Company, Lansing, Mich., will shortly occupy its new building, which will give it 100,000 ft. of floor space.

The Flying Dutchman Aeroplane & Transit Company, Michigan City, Ind., is planning to locate a branch factory in Detroit.

The Keller Pneumatic Tool Company, Grand Haven, Mich., has awarded the contract for its new factory, 190 x 204 ft.

Cleveland

CLEVELAND, OHIO, Jan. 8, 1917.

The General Electric Company has come into the market for about 60 heavy machine tools for its Erie, Pa., works, where a large addition will be erected shortly. A list of the requirements has not been issued, but the machinery to be purchased will include boring mills, lathes, shapers, radial drills, milling machines, and slotters. Twelve traveling cranes from 5 to 50 tons capacity will also be required. Sales have been light the past few days, but there is a good run of new inquiry for one or two machines. Foreign inquiry is also in fair volume. Some of the local machinery houses have placed large orders with machine-tool builders in the past week and have booked machines for delivery in the last half and last quarter of this year and some have delivery up to April, 1918. Deliveries on boring mills, planing machines and milling machines are slower at present than on other lines.

The National Tool Company, Cleveland, which recently effected a reorganization and increased its capital stock to \$1,800,000, is enlarging its plant by the erection of a three-story brick building, 35 x 190 ft., and an office building, 40 x 80 ft. E. A. Noll continues as president; Charles L. Bradley is vice-president, and S. J. Kornhauser is secretary and treasurer.

The Woods Cushion Company, Cleveland, has been incorporated with a capital stock of \$500,000 and plans to manufacture a new type of automobile wheel invented by Edward B. Woods, one of the incorporators.

The directors of the Cleveland Industrial Development Company, Cleveland, have submitted to its stockholders an issue of \$100,000 of preferred stock in the Electric Furnace Company of America, Alliance, Ohio. It is planned to move the plant to Cleveland provided the stock issued is disposed of.

The Hydraulic Press Mfg. Company, Mount Gilead, Ohio, suffered a loss of from \$100,000 to \$150,000 in a fire Jan. 1. Its machine shop is almost a total loss and its erecting room was very badly damaged. The company plans to resume operations in a temporary plant shortly and will rebuild its plant as soon as possible. A large amount of new machinery will probably be required.

The National Engineering & Mfg. Company, Massillon, Ohio, incorporated with a capital stock of \$500,000, plans to establish a plant for building mining machinery and dry air ore concentrators. Melville Limbach, an officer of the Griscom-Russell Company, and other Massillon men are interested in the company. It has been operating an experimental plant in Orville, Ohio, for some time.

The Canton Auto Parts Mfg. Company, Canton, Ohio, is having plans prepared for a new plant which will be erected on a site adjoining the plant of the Zahner Metal Sash & Door Company. The company is now occupying temporary quarters.

The Holmes Automobile Company, in which Canton, Pittsburgh, and Syracuse, N. Y., men are interested, and which will be incorporated with a stock of \$2,500,000, will establish a plant in Canton, Ohio, to build automobiles with air-cooled engines. Temporary offices have been opened and temporary manufacturing quarters secured pending the erection of a plant.

The plant of the Standish Chain Company, Kent, Ohio, is being moved to new quarters in Marietta, Ohio.

The Massillon Foundry & Machine Company, Massillon, Ohio, which is erecting a new plant, has authorized the erection of two additional buildings, one for the pattern making and pattern storage department, and the other for office purposes.

The Atlas Car & Mfg. Company, Cleveland, is in the market for a new or second-hand horizontal boring mill for prompt delivery, equipped with 3½-in. spindle, Lucas type preferred.

The Berger Mfg. Company, Canton, Ohio, recently voted to increase its capital stock from \$5,000,000 to \$10,000,000. It has plans under way for extensions which will include several buildings.

The Titan Chemical Company, 1115 Schofield Building, Cleveland, has been formed with a capital stock of \$200,000 to manufacture a carbonizing compound. It plans to build a plant with a daily capacity of 5 tons and with sufficient

space to install an additional 5-ton unit later and also to provide room for the manufacture of other chemical products. James H. Herron, metallurgical engineer, is president; S. C. Shue, secretary and treasurer, and W. L. Jeffers, sales manager.

The Air Reduction Company, 50 Broad Street, New York, has acquired a site at West Sixty-ninth Street and New York Central Railroad, Cleveland, on which it will erect a plant for reclaiming oxygen from the air for commercial purposes.

Milwaukee

MILWAUKEE, WIS., Jan. 8, 1917.

Local tool builders continue to turn down orders of considerable size, preferring to accept bookings of regular domestic customers, whose individual requirements may not be large, but furnish an aggregate which will require capacity production all of this year, at the least. Deliveries have been facilitated to some extent the past week by the cancellation of local railroad embargoes and a general, albeit slight, relief in the transportation situation of the East. The congestion thus far has not had the effect of affecting production of machine-tools, although in some instances the lack of cars filled warehouses to overflowing. Industries are crying for deliveries because of the urgent need of tools for replacements made necessary by the high pressure and continuity of operations.

The extraordinary demand for cranes and hoists is reflected by the establishment of another crane industry in Milwaukee. The new company, it is said, has purchased an existing plant and will go into operation within 60 days. It is said to have sufficient orders to occupy all available capacity until the early part of 1918.

The Davis Mfg. Company, Milwaukee, manufacturer of internal combustion engines, has awarded contracts for the erection of a one-story addition, 144 x 225 ft., to its main shop at Fifty-seventh Avenue and Mitchell Street, West Allis, and contemplates the enlargement of its foundry in the spring. Frank M. Davis is president and general manager.

The Gerlinger Steel Casting Company, Fifty-ninth and National avenues, West Allis, is building an addition to its foundry and will install another Snyder electric furnace of 4-ton capacity, bringing the total up to 10 tons in 12 hr. The plant is being made into an exclusive electric steel foundry.

The Phoenix Chair Company, Sheboygan, Wis., has engaged Vaughn & Meyer, engineers, Majestic Building, Milwaukee, to plan the complete rehabilitation of its electrical and mechanical equipment. The plant is valued in excess of \$600,000. A. C. Hahn is secretary.

The Kimberly-Clark Company, Neenah, Wis., has awarded contract for a new power house, 60 x 80 ft., at its paper mill in Kimberly, Wis., to cost \$25,000.

The Ladish Drop Forge Company, Cudahy, Wis., is the new corporate style of the Ladish-Obenberger Company, previously known as the Obenberger Drop Forge Company. The change is made by the withdrawal of John Obenberger, who has organized the John Obenberger Forge Company, now operating its new plant in West Allis.

The Kemp Smith Mfg. Company, West Allis, manufacturer of milling machines, will increase its generating equipment to accommodate its extensive shop additions. The work is in charge of Vaughn & Meyer, Majestic Building, Milwaukee, and bids will be taken about Jan. 15.

The Wausau Iron Works, Wausau, Wis., sustained a fire loss estimated at \$8,000 on Dec. 31.

The Southern Wisconsin Foundry Company, Madison, Wis., has increased its facilities to provide for the production of shaking grate bars for power plants. The plant recently was enlarged and the force increased to 85 workmen.

The Aluminum Goods Mfg. Company, Two Rivers, Wis., closed its plant Dec. 23 for one week for overhauling. Its steam turbo-generator unit has been in continuous operation for 6360 hr. without failure.

The Marshall Mfg. Company, Kilbourn, Wis., has been incorporated with a capital stock of \$25,000 to manufacture special manual tools and street-scrappers. The officers are: President, F. H. Marshall; vice-president and treasurer, H. H. Bennett; secretary, C. M. Morris.

The Progressive Metal & Refining Company, 432 Barclay Street, Milwaukee, started work Jan. 2 on the erection of the first unit, 40 x 160 ft., three stories and basement, of its new plant at Barclay and Washington streets. When this is completed, the second unit, 80 x 160 ft., to be devoted exclusively to the manufacture of aluminum ingots and alloys, will be undertaken.

The Mitchell Motors Company, Racine, Wis., has completed a new five-story body and sheet-metal shop and will

build a one-story concrete and steel machine shop addition to its plant No. 1 of the main works. Other improvements under way will double the capacity and afford a production of 25,000 cars for 1917. Otis C. Friend is president and general manager.

The Gilson Mfg. Company, Port Washington, Wis., is seeking 40 additional molders and machinists.

H. E. Wilson, 92 Sixth Street, Milwaukee, is completing plans for the establishment of an automobile repair and maintenance building, two stories, 100 x 200 ft., to cost about \$50,000. It will be located on the lower east side.

The Filer & Stowell Company, Milwaukee, has increased its number of workmen and is making repairs on the buildings, which were damaged but not destroyed in a recent fire. It is also restoring its destroyed patterns. The working force was not reduced 75 or 80 men, as has been stated.

The Ajax Forge Company, Chicago, Ill., will erect a plant at Superior, Wis., to cost \$200,000.

The Allen-Bradley Company, 495-499 Clinton Street, Milwaukee, manufacturer of electric controlling apparatus, has increased its capital stock from \$25,000 to \$136,000 to take care of the rapid expansion of its business. The plant will probably be enlarged, but no details have been given out. Harry L. Bradley is general manager.

The LaCrosse Tractor Company, LaCrosse, Wis., has received contracts for 2750 tractors for 1917 delivery at an average price of \$650 each. If facilities cannot be extended in time to fill these and other contracts, totaling nearly 3250 machines, the company expects to contract with local and outside plants for the manufacture of the surplus. The existing capacity is about 2500 machines.

Indianapolis

INDIANAPOLIS, IND., Jan. 8, 1917.

The Foster Machine Company, Elkhart, Ind., has plans prepared for an addition to be erected at an early date to cost \$70,000. It has on order equipment to cost approximately \$50,000. This company had the largest year of business in its history in 1916, marketing about 3500 turret lathes and screw machines having a value of about \$3,500,000.

The Indiana Truck Company, Marion, Ind., has been incorporated with a capital stock of \$1,000,000, not \$100,000, as was stated in THE IRON AGE of Dec. 28. S. W. Winder is secretary.

The Highway Tractor Company, 227 East South Street, Indianapolis, has elected the following officers: Charles G. McCutcheon, president; Carl G. Fisher, vice-president; James A. Allison, secretary and Henry F. Campbell, treasurer.

Cincinnati

CINCINNATI, OHIO, Jan. 8, 1917.

The Cincinnati Chamber of Commerce has issued a statement showing that in 1916 there were 310 local incorporations, with a total authorized capital of \$27,911,150, and increases to companies already incorporated amounted to \$31,048,000, making the gross gain for the year \$58,959,150. Manufacturing companies represent over 60 per cent of this total. In 1915 there were only 198 new incorporations, and including increases made by established firms, the total was only \$16,238,309, making a net gain for 1916 over the previous year of \$41,658,091.

Inquiries have appeared lately for machine tools that are understood to be for shipment to Spain and Italy. Canadian orders are scarcer, but this is now being made up with the demand for lathes especially from domestic sources. The automobile and auto-truck manufacturers lead in the present buying. So far none of the local jobbing foundries have been compelled to shut down for the want of coke, due to the car embargo, and it is believed that this situation will be clarified before such a step is necessary. Small electrical equipment was never in better demand at this time of the year from domestic sources, although the export business has slowed down to a considerable extent.

The Cincinnati Planer Company, Oakley, Cincinnati, is having plans prepared for an addition to its main machine shop, 100 x 150 ft., one story, of sawtooth roof construction. Another separate building will also be erected.

The Universal Equalizer Company, 202 Bell Block, Cincinnati, has been incorporated with \$100,000 capital stock to manufacture a machine-shop specialty. The officers are as follows: President, S. S. Liston; vice-president, E. C. Steele and secretary and treasurer, W. S. Dueswillius.

The Ohio Pattern Works & Foundry Company, Cincinnati, has been incorporated with \$200,000 capital stock by Joseph E. Hausfeld and others. It formerly operated as the Ohio

Pattern Works Company, under a partnership arrangement. No immediate additions to its plant on Spring Grove Avenue are planned.

B. R. Millikin, receiver of the Hamilton Machine Tool Company, Hamilton, Ohio, has made final payment to all creditors and the receivership will be terminated at an early date. Charles F. Hilker is president of the company.

The Auto Safety Light Company, Dayton, Ohio, is a new company formed by G. F. Dadey and others for the manufacture of automobile specialties.

The Gebhart Folding Box Company, Dayton, Ohio, has been incorporated with \$10,000 capital stock, by Wilbur H. Webster and others, to manufacture folding paper boxes. The company's plant will be located in the Stevens Building.

The Robbins & Myers Company, Springfield, Ohio, manufacturer of electrical equipment, has increased its capital stock from \$1,000,000 to \$5,000,000. The company does not expect to make any extensive additions at an early date, but is constantly adding to its manufacturing equipment.

The Paramount Motor Company, Columbus, Ohio, recently organized, is fitting up a plant at 1432 Parsons Avenue for the manufacture of motorcycles, screw machine parts and other specialties. J. F. Hatcher is president.

The Overholt Machine Company, Seville, Ohio, has been incorporated with \$40,000 capital stock by I. M. Overholt and others. Press reports state that the company will operate a foundry.

L. Brownlow, Cincinnati, will construct a large garage on Rockdale Avenue, with which will be connected a repair shop.

The Standard Stamping Company, Marysville, Ohio, will receive bids about Jan. 15 for the construction of a one-story factory at Huntington, W. Va., 200 ft. square, estimated to cost \$50,000. E. N. Alger, Huntington, is the architect.

The Bullock Electric Company, Norwood, Cincinnati, Ohio, has awarded a contract to the H. C. Hazen Contracting Company, Cincinnati, for additions to its plant estimated to cost \$50,000.

The Manufacturers' Production Company, Dayton, Ohio, will erect an addition to its plant and install heat treating furnaces.

The Central South

LOUISVILLE, KY., Jan. 8, 1917.

Steel-working plants hereabouts are operating on capacity. Materials, it is complained, are becoming harder and harder to get, while railroad embargoes are bearing severely on some lines. One manufacturer stated that on a certain article for export he was 60 days ahead of deliveries. Local farm implement manufacturers announced first-of-the-year advances of from 3 to 15 per cent, the irregular advances equalizing the whole line with costs of materials and manufacture. Motors of all descriptions are in demand.

The plant of the Standard Sanitary Mfg. Company, Louisville, has contracted with the General Electric Company for a 500-kw. motor generator set, for delivery next summer, and will use some central station service.

The Kentucky Culvert Company, Louisville, will erect a one-story steel building at Thirty-first and Walnut streets.

The Reynolds Corporation, Bristol, Tenn., whose plant was recently destroyed by fire, will relocate in Louisville, and has taken a lease on a factory which it will equip to manufacture cleaning powders, etc.

Formation of the Howard Shipyards & Dock Company, with capital stock of \$4,000,000, incorporated in Indiana, was announced at Jeffersonville, Ind., in connection with plans for a railroad extension to the plant of the Howard Shipyards Company near Jeffersonville. The new company, of which Charles D. Brazier, New York, is president, proposes to take over plants of the Howard Company at Jeffersonville, Cincinnati, Madison, Paducah and Mound City, and to manufacture sea-going freight steamers. Roscoe Kent, Jeffersonville, is the local representative.

The Bee Spring Land & Mining Company of Kentucky and the Wadsworth Stone & Paving Company, Pittsburgh, Pa., have consolidated as the Kentucky Rock Asphalt Company, with a capital stock of \$500,000, and will develop 40,000 acres of rock asphalt deposits in Edmonson and adjoining counties. The incorporators include M. M. Logan, Frankfort, Ky.; James Garnett, Louisville, Ky.; W. C. Thoma, Pittsburgh, Pa., and W. E. Williams, Lexington, Ky.

The Skinner Hemp Brake Company, Winchester, Ky., has been incorporated with a capital stock of \$25,000 by Cornelius Skinner, J. L. Skinner, and others, and proposes to manufacture a power machine for separating hemp fiber from the stalks.

The Mitchell Automobile Company, Memphis, Tenn., will

occupy a building for automobile supplies which will be erected for J. H. Bubose, owner, who has let the contract to J. E. Hollingsworth, Memphis. The cost without mechanical equipment will be \$26,000.

The W. H. Neill Company, Louisville, Ky., dealer in mill supplies, by charter amendment, changes its name to the Neill-LaVielle Company. M. F., J. L. and W. R. R. LaVielle are owners of a majority of the stock.

The Curry-Champion Fly Trap Company, Paducah, Ky., has been incorporated with \$9,000 capital stock by H. R. Lindsey, president; H. M. Jeppesen, secretary, and others, to equip a plant for manufacture of a patented device.

The Stout Furniture Company, Salem, Ind., has decided to rebuild its plant at an estimated cost of \$100,000. A. L. Stout is president.

The Tennessee Lumber & Veneer Corporation, Johnson City, Tenn., is asking for prices on rebuilt equipment, including a 7-ft. band sawmill, veneer sawmill, veneer slicer, veneer dryer, 100-in. veneer lathe and veneer clippers.

The Lookout Paint Company, Chattanooga, Tenn., will rebuild its plant recently destroyed by fire at an estimated loss of \$100,000.

The Colonial Lumber Company, Bearden, Tenn., will purchase a 50-hp. power plant for sawmill and electric lighting; using a gas engine for generating, the engine to use gas from slack coal.

Birmingham

BIRMINGHAM, ALA., Jan. 8, 1917.

Demand for hydroelectric and other apparatus for the Alabama graphite milling field is extremely active. The coal mines are calling for more machinery than in several months. The sawmill trade is rather quiet, but, for the rest, the wholesale machinery trade is very good, as good as it was during last fall. The only trouble is to get deliveries.

The American Forgings Company, Birmingham, Ala., which operates the plant formerly occupied by the International Harrow Cultivator Company, which discontinued business some time ago, is at present manufacturing very largely, turnbuckles and small automobile drop forgings and is running its plant to capacity. It intends to go on double turn shortly, and is contemplating the adding of several new hammers. Sufficient grounds are available to add very materially to its present output and this will be done as necessity requires. The present equipment and buildings are sufficient for the time being; however, later it anticipates making some extensive improvements. The company reports business unusually good in the drop forging line. It has several large contracts for Southern railroads, also with shipbuilding companies for turnbuckles during 1917. R. I. Ingalls is president.

The Yolande Coal & Coke Company, Birmingham, will expend \$100,000 immediately in opening a new mine with 3500 tons daily capacity, and will ultimately invest \$300,000 in addition to its mining and coking plant. A by-product plant is one of the ultimate plans.

The Montgomery Light & Water Power Company, Montgomery, Ala., will expend \$125,000 enlarging its hydroelectric plant at Tallassee by adding units, constructing a substation, etc.

The Queen City Machinery Company, Gadsden, Ala., has been incorporated with a capital stock of \$6,800 to manufacture mining equipment, structural and ornamental iron, etc. G. F. Bently, E. B. Fullington, and others, are among the incorporators.

The Ajax Clay Works, Macon, Ga., organized with \$100,000 capital stock, will manufacture fire brick, hollow tiles, etc. It plans a capacity of 60 tons per day.

The A. T. Small Quarries Company, Macon, Ga., organized with a capital stock of \$75,000, will build a steam-operated plant at Holton, using a 100-ton steam shovel, dinky engines, etc. The entire cost of development is to be about \$175,000. The plant will have a daily capacity of 2000 tons.

Texas

AUSTIN, TEX., Jan. 6, 1917.

Dealers report an unusual number of inquiries, particularly for machinery for various manufacturing plants.

The Hunt Grain Company will build a grain elevator at Wichita Falls with a capacity of 220,000 bu. The building will be of reinforced concrete and will be fully equipped with machinery.

The Arizona Power Company, Prescott, Ariz., will construct an additional electric power station of 10,000 hp. to supply the mines in the Jerome district.

The Alto Cotton Oil & Mfg. Company, Alto, recently incorporated with a capital stock of \$25,000, will build a cottonseed oil mill. H. H. Berryman is active in the organization.

The Dixie Oil & Refining Company, San Antonio, has increased its capital stock from \$100,000 to \$115,000 and will make improvements to its plant.

The Wills Point Electric Light Company, Wills Point, which recently increased its capital stock from \$10,000 to \$20,000, will make improvements to its plant.

It is announced that the organization plans for the Texas & Pacific Railroad will include the expenditure of about \$5,000,000 in the complete rehabilitation of the property.

The Arizona Lead & Zinc Company, Flagstaff, Ariz., plans to install a hydroelectric plant at Mooney Falls.

D. T. Baldwin, Shafter, will install a pumping plant to water 1000 acres of land.

It is reported that the Magnolia Petroleum Company, which recently purchased the holdings of the McMann Oil Company in Kansas and Oklahoma, for about \$35,000,000, will build one or more additional oil refineries.

The El Paso Electric Railway Company has increased its capital stock from \$2,500 to \$3,500. It will make additions and improvements to its power plant and other holdings. The Stone & Webster Engineering Corporation, Boston, Mass., is the owner.

St. Louis

ST. LOUIS, Mo., Jan. 8, 1917.

The new year shows no signs of a halt in the volume of machine-tool business; on the contrary, it is expected that a considerable amount of extension and replacement work will take place, although this is not expected to be of large character. Dividend payments have been heavy in this section, while bonuses have been numerous and large, with many wage increases. At the same time many companies have set aside special reserves out of their heavy profits to be ready for any emergency that may arise.

The Aetna Spring & Ring Company, St. Louis, has been incorporated with a capital stock of \$12,000 by M. A. and J. F. Jenkins and S. E. Ellman to manufacture motor vehicles and accessories.

John Mesker, St. Louis, has begun the erection of a building to be equipped for the manufacture of sheet metal products.

The Kansas City Light & Power Company, Kansas City, Mo., will equip a heating plant at a cost of about \$46,000.

The Sanitary Engineering & Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of \$25,000 by F. R. Megan, Sam B. Strother and William T. Campbell and will equip a plant.

A motor car assembling plant with an annual capacity of 12,000 cars will be equipped at Kansas City, Mo., by the Maxwell Motor Car Company at Detroit, Mich. A four-story building is to be erected for the purpose.

The Kelley Lumber Company, Searcy, Ark., will re-equip its milling plant recently burned, the new capacity to be 20,000 ft. of hardwood lumber daily. J. A. Reynold is engineer in charge.

The Citizen's Service Company, Muskogee, Okla., has been incorporated with a capital stock of \$100,000 by A. S. Nelson and others and will establish electric light and power plants.

The Sinclair-Cudahy Pipe Line Company, Tulsa, Okla., has acquired the Tidal Oil Company pipe line and will extend and increase its pumping equipment.

McKinney & Shields, Checotah, Okla., will equip a machine shop and garage, having acquired a two-story building therefor.

The Ford Motor Company, Chickasha, Okla., J. P. Wolverton in charge, will equip a garage and machine shop at a cost of about \$12,000.

The Commerce Motor & Supply Company, Commerce, Okla., has been incorporated with a capital stock of \$100,000 by Lon Edwards and others and will establish a garage and machine shop.

The Charleston Cooperage Company, Charleston, Miss., has been incorporated with a capital stock of \$50,000 by G. E. Lamb, W. B. Burke, and others, and will equip a plant.

The Dixie Cooperage Company will equip a plant at Vicksburg, Miss., with a capacity of 75,000 hoops per day. O. K. Trook, Indianapolis, Ind., and John E. Osborne of Greensburg, Ind., are the chief stockholders.

The Kansas City Bolt & Nut Company, Kansas City, Mo., wants an alligator shear of 4-in. x 1-in. capacity.

San Francisco

SAN FRANCISCO, CAL., Jan. 2, 1917.

Year-end operations have caused an abrupt contraction of machine-tool business since Christmas. Conditions promise a renewal of activity before February, as nearly all shops have an abundance of work on hand. The greatest rush is with the shipbuilding plants, which are still placing frequent orders. Implement manufacturers also are working at full capacity and constantly increasing their facilities. Miscellaneous lines continue exceptionally active for this time of the year. The outlook for hydroelectric development is the best in several years. Railroad buying here remains rather limited.

The City Council, Los Angeles, has acted favorably on the petition of John T. Flynn, shipbuilding engineer, for the lease of 75 acres of water frontage to be used for a shipbuilding plant.

S. Duschak has purchased the Davis Machine Shop, Taft, Cal.

The Pacific Electric Railway Company has started work on shops at Torrance, a suburb of Los Angeles. Fourteen buildings will be erected, covering 30 acres.

The Standard Steel Wheel & Armour Company, of which J. M. Benham, Oakland, is president, has arranged for the purchase of a factory site near Stockton, Cal., where it is proposed to build a plant for the manufacture of a patent steel carwheel.

The Llewellyn Iron Works, Los Angeles, Cal., has taken out permits for two buildings, 50 x 250 ft., and 50 x 125 ft., to be occupied as machine shops, to replace those recently destroyed by fire.

The Imperial Cotton Machinery Company has secured permission to issue \$150,000 of its common stock to T. H. Gabel and H. H. Holdaway in exchange for patents covering a cotton-picking machine.

Charles C. Moore & Co., San Francisco, have been awarded contract for the construction of a 10,000-kw. electric generating plant for the Arizona Power Company on the Verde River, Arizona.

The Swift Tack & Nail Company has bought the machinery of the Judson Mfg. Company's tack and nail department, Emeryville, Cal., which was recently crowded out by the expansion of the rolling mill department, and is preparing to start a new plant in the vicinity.

The Pacific Northwest

SEATTLE, WASH., Jan. 2, 1917.

The phenomenal prosperity of the shipbuilding industry in the Pacific Northwest gives no sign of decreasing, and the wooden hull shipbuilding branch shows rapid progress. Contracts for deep sea sailing vessels are now being closed. Approximately 1,500,000 ft. of lumber is used in building the type of schooner now demanded by the over-sea lumber trade. The shipbuilding industry in Seattle, which one year ago had a payroll of \$70,000 monthly, now pays out monthly the sum of \$600,000, based on an investment of \$42,000,000 in vessels under construction or contract.

Seattle's ocean-borne commerce for the year 1916, when the December figures are compiled, will pass the \$400,000,000 mark, as against a total of \$257,792,393 in 1915. It is estimated that Alaska's part in the 1916 trade will amount to \$65,000,000, as compared with \$45,000,000 in 1915. The tremendous development work in mining properties in Alaska has played an important part in the trade.

The National Shipbuilding Company, Seattle, recently incorporated for \$40,000, has taken over the shipbuilding plant of Johnson Brothers & Blanchard in Seattle. The plant will be overhauled and some new machinery installed.

The Simmons Company, Kenosha, Wis., manufacturer of metal beds and springs, plans to establish a branch plant at Butte, Mont., which will cost about \$40,000.

Plans for the proposed sawmill to be built by the Oregon Lumber Company in Baker, Ore., are completed, and include a plant with a capacity of 200,000 ft. daily to cost \$150,000. It will replace its plant destroyed by fire in September. All the equipment will be new. The plant will be electrically operated, and a subsidiary electric plant will be constructed to generate 500 hp. D. C. Eccles, Ogden, Utah, is president.

The Willamette Iron & Steel Works, Portland, recently closed contract to supply 1000 tons of water pipe for delivery in fall of 1917. The contract, it is stated, will amount to about \$150,000.

The Elliott Bay Yacht & Engine Company, Seattle, has recently secured contracts for 5 vessels for United States Immigration Service, the contracts totaling about \$30,000.

W. E. Craine of the Craine Logging Company and G. R.

Shanks, both of Bandon, Ore., have completed plans for a factory to manufacture cedar chests.

The Northwest Marine Construction Company, Seattle, has been incorporated for \$500,000 by A. F. McFarland, San Diego, Cal.; F. J. Carver and B. M. Pinneh, Seattle. It will specialize in wooden auxiliary powered ships of about 300 ft. length. The site of the proposed plant is said to have been selected.

The Hawley Pulp & Paper Company, Portland, Ore., announces that it will begin work immediately on another unit of buildings adjoining its present plant at Oregon City, to cost about \$100,000. The new unit is to house additional paper machines, beaters and finishing equipment.

The Doernbecher Mfg. Company, Portland, Ore., has completed plans for an additional unit to its plant to be utilized as a chair factory. It will be three stories, 85 x 250 ft.

The Albina Engine & Machine Company, Portland, has let contracts for construction of three sets of shipways for its new plant at Albina, near Portland. This will give it five sets of ways. The plant will represent a cost of \$250,000 complete.

The Puget Sound Iron & Steel Works, Tacoma, is doing 100 per cent more business than for the same period last year. The concern is kept busy with the manufacture of semi-diesel engines, logging machinery, etc. An addition to its foundry was made last summer. John L. Roberts is president.

The Pacific States Timber Investment Company, Baker, Ore., has received contract from the United States Government for 125,000,000 ft. of timber, and will construct a mill of 150,000 ft. daily capacity to cost \$100,000. It will be operated throughout with individual electric motors. A central power plant and planing mill will also be constructed.

The Western Gear Works, Seattle, has awarded contract for the construction of its proposed one and two-story brick plant to cost about \$10,000.

Canada

TORONTO, ONT., Jan. 8, 1917.

An important feature of the industrial development of Canada is the large number of United States manufacturing companies now establishing branch plants in the Dominion. Building in Canada has by no means recovered from the slump which followed the declaration of war. Figures for 1915 were less by 63 per cent than in 1914, according to reports from 82 localities. In the Maritime Provinces there was practically no change in the volume of building despite the war, out it changed in character. The ports and industries of the Atlantic coast were called upon to handle war munitions on a tremendous scale, which necessitated much new structural work. Following the outbreak of war the demand for new building fell off, and no capital was available. At present dwellings and factory buildings are being erected to meet a fairly large demand for them, and a certain amount of capital is available, but the chief deterrents to activity are labor scarcity and high cost of all materials. The permits issued in 1916, although on a larger scale than in 1915, cover factories and commercial structures chiefly, which were needed to accommodate special business arising out of war conditions.

The Ontario Hydro Electric Commission, University Avenue, Toronto, is preparing plans for the proposed Chippewa Canal power project to be commenced next spring. The commission will invest \$800,000 in construction equipment to dig the 12-mile canal through which water will be taken from the Chippewa Creek to Queenston, where the power plant will be built. It is estimated that the work will cost between \$8,000,000 and \$9,000,000.

E. I. Sifton, engineer, Hamilton, Ont., is making preparations for the installation of a storage system and booster pump at the Beach pumping plant to cost \$25,000.

Montreal South, Que., proposes to construct a waterworks system at a cost of \$180,000, including the installation of pumps, etc. E. Drinkwater, 588 Boulevard Desaulniers, St. Lambert, Que., is the engineer.

The plant of the Canada Furniture Mfg. Company, Ltd., Warton, Ont., was destroyed by fire with a loss of about \$30,000.

The plant of the National Machinery & Supply Company, Hamilton, Ont., was damaged by fire Jan. 4 with a loss of about \$20,000.

W. A. Mahoney, 79 Quebec Street, Guelph, Ont., is preparing plans for a pipe foundry for the Canada Stove & Foundry Company, Ltd., St. Laurent, Que. It will be of concrete and brick and will cost \$36,000. Tenders will be called about April 1. The company is also having plans prepared for a boiler house to cost \$30,000, on which tenders will be called about March 1. J. St. Germain is manager.

The Nova Scotia Steel & Coal Company, New Glasgow, N. S., will purchase a new or good second-hand motor-driven centrifugal mine pump of 500 to 750 gal. per min. capacity against a head of 250 ft.

The Page-Hersey Iron, Tube & Lead Company, Toronto, is in the market for about 40,000 unmachined base plate forgings for 6-in. British shells.

The International Malleable Iron Company, Ltd., Beverly Street, Guelph, Ont., is having plans prepared for a foundry of concrete, steel and brick to cost \$15,000.

The Ottawa Car Company, Slater Street, Ottawa, is building a plant at a cost of \$40,000.

The Pacific Great Eastern Railway Company, Vancouver, B. C., will commence work soon on a machine shop at Squamish, B. C., to cost \$15,000.

The St. Catharines Brass Works, Ltd., George Street, St. Catharines, Ont., has commenced the erection of a foundry to cost \$30,000.

The Crucible Steel Company of America, 19 St. Peter Street, Montreal, will build an addition to its plant at St. Johns, Que., and is in the market for new machinery.

The Pratt Engineering Company, New York City, has commenced the erection of a plant at Trenton, Ont., for the Imperial Munitions Board of Canada, Ottawa, for the manufacture of fuses, munitions, etc.

The Wagner, Chambers, Glasco Company, Ltd., Toronto, has been incorporated with a capital stock of \$50,000 by William E. Wagner, 19 Gerrard Street, East; James L. Chambers, 15 Lark Street; Joseph G. Singer, and others, to manufacture munitions.

The Corbet Foundry & Machine Company, Ltd., Owen Sound, Ont., is in the market for a 10-hp. electric motor for its hydroelectric power for immediate delivery.

The United Metals, Ltd., London, Ont., has been incorporated with a capital stock of \$50,000 by Thomas A. Stevens, George M. Reid, John F. Grant, and others, to manufacture metals, iron, steel, tin, copper, etc.

The Capital Machinists & Founders, Ltd., Ottawa, has been incorporated with a capital stock of \$50,000 by M. J. Skelly, Walter L. Goode, Ephraim P. McGill, and others.

The Port Arthur Shipbuilding Company, Ltd., Port Arthur, Ont., has been incorporated with a capital stock of \$2,500,000 by Donald R. Hossack, 156 Yonge Street; Donald B. Sinclair, 44 King Street West; John C. Leckie, and others, all of Toronto. It will take over the property of the Western Dry Dock & Shipbuilding Company, recently purchased by John Burnham and others.

The plant of the Hayes Wheel Company of Canada, Chatham, Ont., will not be converted into a munitions plant as stated in THE IRON AGE of Dec. 21, as it already has a separate department devoted to such work. The company will continue to supply its trade with wheels as in the past. William Kistler is manager.

Catalogs Wanted

The Patent Selling & Mfg. Agency, Room 504, 22 College Street, Toronto, Canada, desires to receive catalogs and data concerning machinery and general factory equipment.

Government Purchases

WASHINGTON, D. C., Jan. 8, 1917.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 586, for one 30-kw. generator for Mare Island; schedule 592, for 16 torpedo air compressors, f.o.b. works; schedule 595, for one saw-sharpening machine, one band saw machine and one cutting machine, all for Washington; schedule 605, for 20 sheet iron folding machines for Brooklyn.

The commanding officer of the Rock Island Arsenal, Rock Island, Ill., opened bids Dec. 15 for supplying 42 machine tools for the arsenal. In many cases awards were made, but in some instances bids were rejected and in others the award is still pending.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Jan. 3, for supplies for the naval service as follows:

Schedule 492, Steam Engineering

Class 74, Norfolk—One back-geared engine lathe—Bid 151, \$1,348 and \$1,393; 161, \$1,496, \$1,497, \$1,508 and \$1,421; 183, \$985.

Class 75, Norfolk—One double emery grinding machine—Bid 44, \$241.50; 46, \$234; 47, \$279; 161, \$233.50; 183, \$185 and \$207.

Class 76, Norfolk—One two-speed universal bench drill—Bid 151, \$111; 183, \$114.

Schedule 493, Steam Engineering

Class 77, Boston—One engine lathe and one set parts for motor—Bid 151, \$1,095; 161, \$1,405; 183, \$965; 185, \$1,650; 192, \$1,785 and \$1,525.

Class 78, Boston—One column shaping machine and one set spares—Bid 151, \$983 and \$1,180; 183, \$885; 185, \$1,388; 192, \$1,225; 195, \$1,131.

Class 79, Boston—One upright drill press and one set of spares—Bid 151, \$494, \$575 and \$610; 183, \$565 and \$1,555.

Class 80, Boston—One emery grinding machine and one set of spares—Bid 44, \$221.50; 46, \$350.70; 47, \$287; 183, \$205 and \$227; 257, \$223.50.

Schedule 494, Steam Engineering

Class 81, Boston—One die-sinking machine—Bid 301, \$4,131.

Schedule 501, Construction and Repair

Class 141, Boston—One overhead electric traveling crane—Bid 62, \$19,800; 161, \$10,568; 185, \$9,225; 252, \$11,210; 278, \$12,250.

Schedule 502, Steam Engineering

Class 152, Boston—One motor-driven hobbing machine for worm wheels—No bids.

Schedule 508, Steam Engineering

Class 193, Boston—One automatic tapping machine—Bid 28, \$4,730, f.o.b.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 28, Baker Brothers; 44, James Clark, Jr., Electric Company; 46, W. Irwin Cheyney; 47, Cincinnati Electric Tool Company; 62, Cleveland Crane & Engineering Company; 151, Kemp Machinery Company; 161, Manning, Maxwell & Moore, Inc.; 183, D. Nast Machinery Company; 185, Niles-Bement-Pond Company; 192, Henry Prentiss & Co., Inc.; 195, Potter & Johnston Machine Company; 201, Pratt & Whitney Company; 252, Shepard Electric Crane & Hoist Company; 278, Whiting Foundry Equipment Company.

NEW TRADE PUBLICATIONS

Alloy and Tool Steels.—Midvale Steel Company, Philadelphia, Pa. Catalog No. 33 and pamphlet. The former is concerned with the various alloy and tool steels made by the company, which include carbon and special alloy tool and high-speed steels and stellite. Directions for working the carbon tool steels are presented followed by a list of the grade numbers and the uses to which the various ones may be put. The labels of the different brands are reproduced and a brief statement of the work for which they are adapted given, and the same arrangement is followed for high-speed steels. Mention is made of various tool steel specialties, steels for hot work and forged shear blades, die blocks and steel rolls that can be furnished. A number of tables of useful information and characteristic treatment curves are included. The pamphlet gives general information about a line of high-speed tool steel including their forging, annealing, turning and grinding. Brief descriptions of the various brands are presented, and a table of standard extras is included. A number of engravings showing the tools made from these steels in use are presented.

Electric Welding Machines.—Winfield Electric Welding Machine Company, Warren, Ohio. Catalog. Deals with a line of electric welding machines of the spot and butt types. The welding process is described with particular reference to its economy and general descriptions of the two types of machines are presented, together with data on the cost. Views of the different machines are given and a number of engravings showing them in use in industrial establishments of various kinds are presented. Tables of data on butt and spot welding are included.

Textile Machinery.—Draper Company, Hopedale, Mass. Calendar hanger measuring 11 x 14 in. The pad is of the same type that has been employed by the company for a number of years, a complete calendar for the month being given followed by leaves giving spaces for memoranda for the days of each month. A mention of the various machines built by the company is given on each of the memoranda sheets.

Internal Combustion Engine Pumping and Generating Sets.—Universal Motor Company, Oshkosh, Wis. Two bulletins. The first, No. 16, shows a 3-in. centrifugal pumping outfit having a capacity of 265 gal. per min. against a total head of 55 ft. which is driven by a direct-connected internal combustion engine. A brief description of the construction of the outfit and the uses to which it may be put

is included. The other bulletin, No. 20, contains a number of illustrations of different types of small electric generating sets for use where central station power is not available. The construction and advantages of the sets are gone into at some length and a condensed table of specifications is included.

I-Beam Trolleys and Electric Hoists.—Roeper Crane & Hoist Works, 1729 Moss Street, Reading, Pa. Two bulletins. The first, No. 104, is concerned with a line of single I-beam adjustable trolleys or travelers with steel side frames and plain or roller bearings. Views of the geared and non-geared types of trolleys are presented together with brief descriptions and clearance tables. Mention is made of the switches and turntables employed in connection with the hoists. The second bulletin, No. 105, gives a brief description and specifications of an electric hoist that is built in sizes ranging from ½ to 6 tons for use on either alternating or direct current circuits. A table of data on the various sizes and types of hoists is included.

Silent Chain Drive.—Morse Chain Company, Ithaca, N. Y. Publication No. 15. This is the third of a series "A Chain of Evidence," the first having dealt with textile mills and the second with large power drives. This publication describes and illustrates the use of silent chain for drives up to 100 hp. The advantages of positive speed ratio, sustained efficiency, quietness, convenience of application, etc., are briefly touched upon and a general description of the chain is included. The greater part of the book, however, is given over to engravings showing the chain in use at a great variety of industrial establishments. Among the uses illustrated are the driving of machine tools, triplex pumps, rock crushers, paper mill equipment, line shafting, fans and wood working and textile machinery. In connection with each engraving brief descriptions of the size of chain, speed, number of teeth on the sprockets and center distances are included.

Milling Machines.—C. M. Conradson, Eau Claire, Wis. Circular. Relates to a plain milling machine equipped with a single-pulley drive. An illustration of the machine, which has a double helical drive to the spindle, is presented, together with a description in the form of a set of specifications.

Hydraulic Presses and Pumps.—Hydraulic Press Mfg. Company, Mount Gilead, Ohio. Catalog No. 70. Size, 8 x 10 in.; pages, 84. Pertains to a line of hydraulic machinery particularly adapted for export. The lines covered include metal working, veneer, baling, abrasive wheel, leather, hot plate and miscellaneous presses and hydraulic valves and pumps. Views of the various presses and pumps are presented and brief descriptions and condensed specification tables are included in practically every case.

Gears.—Philadelphia Gear Works, 1120 Vine Street, Philadelphia, Pa. Calendar hanger. The upper half of the hanger, which measures 11 x 14½ in., is given over to an illustration of the company's slogan, "Our Gears Go Around the World," which is effectively carried out by a reproduction of the globe encircled by a gear meshing with a pinion. Reference is made to the various lines produced by the company which include spur, bevel, spiral and worm gears and rawhide pinions. The calendar pad contains the dates for three months on each leaf and indicates the number of days that have elapsed since the first of the year.

Electric Welding.—Arc Welding Machine Company, 220 West Forty-second Street, New York City. Booklet. Illustrates a constant-current closed-circuit system of arc welding in which the circuit from the generator, which is of a special type, runs to each point at which welding is done in series. A description of the system and the generator used is presented, and considerable information of an educational character on the use and advantages of the system is included.

Panel Boxes.—Sprague Electric Works of the General Electric Company, 527 West Thirty-fourth Street, New York City. Pamphlet. Lists a line of panel boxes in which the door covering the fuse compartment is locked thus making this compartment accessible only to authorized persons having keys. The door covering the switch compartment is held closed by a spring catch so that the switch handles are accessible to anyone for operation while no live parts are exposed. Mention is made of a dead front switchboard and views of the front and rear are included. The front cover of the booklet is a reproduction of the cover of the panel box and is cut out to illustrate the safety features provided.

Industrial Construction.—Westinghouse, Church, Kerr & Co., 37 Wall Street, New York City. Folder. Treats of the wide range of work handled by this company. A partial list of the products of plants or factories that have been designed and built is included, the list ranging all the way from aeroplane motors to war vessels.

Transmission Machinery.—Bond Foundry & Machine Company, Manheim, Pa. Catalog No. 37 and pamphlet. Both call attention to the advantages of using the company's

line of power transmission machinery, which includes hangers of the post and drop types, pillow blocks, floor stands, couplings, safety collars, iron pulleys, etc. Illustrations and brief descriptions of the various members of the line are presented, and specification tables are included. A telegraph code and a complete index are given.

Skip Hoists.—R. H. Beaumont Company, Drexel Building, Philadelphia, Pa. Catalog No. 32. Calls attention to a skip hoist for handling ashes. A number of views of installations of the hoist are presented, and information on the savings in labor and the other advantages resulting from the use of the hoist are presented.

Thermal Transformation Point Apparatus.—Leeds & Northrup Company, 4901 Stenton Avenue, Philadelphia, Pa. Bulletin No. 866-A. Gives general description and specifications for a line of apparatus for the location of thermal transformation points such as the critical, recalescence and decalescence points in the heat treatment of metals. The method, which consists essentially in heating a small sample of the metal in contact with a larger neutral body and simultaneously measuring the temperature of the sample by a thermocouple and the temperature difference between the sample and the neutral body by a different thermocouple while the apparatus is being slowly heated and cooled, is described. The apparatus plots these two quantities as co-ordinate upon a rectangular chart, and the temperatures at which the various transformations occur are easily indicated by rapid increases in the temperature difference between the sample and the neutral body. A number of views of the apparatus and reproductions of charts obtained from it are included.

Resuscitation Apparatus.—Draeger Oxygen Apparatus Company, 422 First Avenue, Pittsburgh, Pa. Circular. Devoted to the type B Pulmotor, which is a hand-operated resuscitation device equipped with a pressure control valve. This valve, which is the distinctive feature of the apparatus, is operated entirely independently of the pump and not only applies but controls the air pressure producing inhalation or exhalation of the patient's lungs. A description of the apparatus is presented with special reference to the construction and use of the valve and the text is supplemented by a number of engravings showing the apparatus in use, details of the various parts and the portable and hospital types that can be supplied.

Drilling Machines and Boring and Turning Mills.—Colburn Machine Tool Company, Franklin, Pa. Collection of loose-leaf bulletins. Illustrations and descriptive matter explain the construction and operation of a line of heavy-duty vertical drilling machines and boring and turning mills. As a general rule, an engraving of the particular machine covered in the bulletin is given on the first page, followed by descriptive matter and specifications. The drilling machines range from 24 to 36 in. in capacity, while the range of the boring mills is from 30 to 72 in.

Power Hammers.—United Hammer Company, 141 Milk Street, Boston, Mass. Pamphlet. Illustrates and describes a line of belt-driven power hammers which were formerly built by E. & T. Fairbanks & Co. and are now being built by this company. Specification tables of the hammer are included.

Routing Cutters.—John Royle & Sons, Paterson, N. J. Circular No. 280. Mentions a line of routing cutters that are made in nine styles and three grades. Drawings showing the contour of the different cutters are presented, together with tables of the sizes that can be furnished for each grade.

Screw Machines.—Foster Machine Company, Elkhart, Ind. Bulletin. Points out the advantages of using the company's No. 5 screw machine for manufacturing parts from bar stock, castings and forgings. Among the ones upon which special emphasis is laid are ability to take heavy cuts combined with an ease of manipulation of the tool carrying slides to give a high rate of production on both light and heavy work and an extensive tool equipment. The machine is described at some length, the text being supplemented by a number of engravings of the various parts. Specifications for the geared friction and all geared headstock types are presented, and a number of the standard tools and attachments that can be furnished are illustrated and briefly described.

Humidity and Temperature Regulating Devices.—Carrier Engineering Corporation, 39 Cortlandt Street, New York City. Bulletin No. 102. Describes a line of controlling devices to meet all commercial humidity and temperature requirements. The several factors upon which a system of control depends, such as the number and sizes of rooms, their contents, the arrangement of machinery, the source of heat and moisture, the effect of air currents and the exact amount of humidifying, dehumidifying, heating, cooling and drying, or combinations of these which are to be accomplished, are explained. The various devices are illustrated and briefly described, and a number of charts obtained with them are included.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

RIGHTS UNDER SHIPPING NEGOTIATIONS.—A railroad company's quotation of a water rate on a contemplated shipment of cast-iron pipe to Panama, in response to a request as to the best ocean rate it could offer, was a mere offer which did not result in a contract, in the absence of an acceptance thereof. A contract to furnish ocean transportation for 5000 tons of pipe does not require the carrier to accept a shipment of only 2100 tons, nor does it require that a steamer, as distinguished from a sailing vessel, be furnished, in the absence of agreement or custom to the contrary. (Mississippi Supreme Court, Gulf & Ship Island Railroad Company vs. United States Cast Iron Pipe & Foundry Company, 72 Southern Reporter, 882.)

WORKMEN'S COMPENSATION ACT APPLIED.—A salesman of machinery is to be regarded as engaged in the "manufacture" of machinery, a hazardous employment covered by the New York workmen's compensation act, where it appears that his duties required him to inspect machinery after installation. Hence, he is entitled to an award for injury sustained through the fall of a part of machinery which he was inspecting. (New York Court of Appeals, Benton vs. Fraser, 114 Northeastern Reporter, 43.)

MANUFACTURER'S RESPONSIBILITY CONCERNING DEFECTS.—As a general rule, a manufacturer of a machine is not liable to third persons who have no contractual relations with him for negligence in the construction, manufacture, or sale of the articles he handles. The principal exception to this rule applies in the case of the manufacture of things which are inherently dangerous unless properly constructed. (Oklahoma Supreme Court, Livesay vs. Ford Motor Company, 160 Pacific Reporter, 901.)

RIGHTS UNDER CONDITIONAL SALES CONTRACTS.—An assignment for the benefit of creditors gives the assignee no title to property in the possession of the debtor, known by the assignee to be held under a contract reserving title in the seller until payment of the purchase price. Nor does a purchaser of the debtor's assets under a sale thereof made by the assignee obtain good title to property previously reclaimed by the conditional seller. (Washington Supreme Court, Sunel vs. Riggs, 160 Pacific Reporter, 950.)

REMEDYING DEFECTIVE PATENTS.—When a patent is found to be defective by reason of some mistake or omission in the description of the invention or the patentee's claims, the remedy is to surrender the original patent and apply for a re-issue. But, in such case, the patentee will not be permitted to enlarge the scope of his claim so as to include other inventions and devices made since the grant of the original patent and in public use. (United States District Court, Western District of New York, Perfection Spring Service Company vs. American Auto Heater Company, 236 Federal Reporter, 256.)

SCOPE OF THE WORKMEN'S COMPENSATION ACTS.—Provision in a workmen's compensation act for payment of awards for injuries to employees sustained in the course of their employment creates no liability against an employer on account of injury to a traveling salesman in a hotel fire, the fire occurring while the employee was asleep and not at work. (California District Court of Appeals, Forman vs. Industrial Accident Commission, 160 Pacific Reporter, 857.)

VALIDITY OF BUSINESS CONTRACTS.—Although proof that a letter accepting an order was mailed, properly stamped and addressed, raises a presumption that it was received by the addressee, it cannot be inferred that such a letter was mailed or received merely because it was signed and intrusted to an office boy to place in its proper envelope and mail it, in the absence of proof of actual mailing. An oral agreement for sale of goods at a price exceeding \$50 is invalid when unaccompanied by any partial delivery by the seller or payment by the buyer. (New York Supreme Court, Appellate Division, Elmore vs. Busseno, 161 New York Supplement, 533.)

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